UNIVERSITY OF WOLLONGONG

ANNUAL REPORT 1990

Front cover

A University Open Day attraction

This was how many hundreds of visitors to the campus on August 26 last, who looked at the screen of a scanning electron microscope in the University, were introduced to the excitement of biological research. What they saw at x 100 magnification was the claw at the distal end of a leg of a funnel-web spider. For scanning purposes the claw was gold coated by the University Electron Microscopist, Mr Nick Mackie, in the Department of Materials Engineering. And for our illustration the black-and-white negative was electronically and artificially coloured by Mr Bill Zealey, senior lecturer in the Department of Physics

UNIVERSITY OF WOLLONGONG

Arms of the University

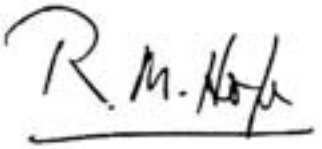
The principal elements incorporated in
the arms of the University are the blue of the sea,
the gold of the sand and the red of the Illawarra flame tree.
The open book often used for educational institutions is also included.
The blazon is: Azure an open book proper bound gold
on a chief wavy of three cinquefoils gules

ANNUAL REPORT 1990

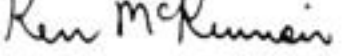
The Honourable Virginia Chadwick, MP, Minister for Education

Dear Minister

In accordance with section 10(i) of the Annual Reports (Statutory Bodies) Act, 1984, and Section 34 of the Public Finance and Audit Act, 1983, the Council of the University has the honour to present to you, for tabling to the Parliament, the *Annual Report* of the proceedings of the University for the period 1 January to 31 December 1990.



Chancellor



Vice-Chancellor and Principal

ISSN 0313-6906

University of Wollongong
Northfields Avenue
Wollongong NSW
Postal address: PO Box 1144, Wollongong
NSW 2500 Australia
Telephone: (042) 21 3555
Facsimile: (042) 21 3477
Cable: UNIOFWOL

All enquiries should be addressed to the
Vice-Principal (Administration)

content

Highlight

THE single most important highlight of the year was undoubtedly the frequent evidence of positive staff and student morale. This was so, despite the continuing wave of changes in higher education policies and developments external to the university. Though there was much to grumble about in the disparity between academic salaries and those prevailing in the general community, the staff at the University of Wollongong were keen to increase further the University's growing reputation. The very high level of positive energy among both senior and junior staff, a rare and precious thing, is remarked upon by all visitors. The task for the new year will be to maintain and enhance that teamwork.

The following résumé of events and developments chronicles several of the aspects of the university's never-ending pursuit of high standards - important additions and improvements, milestones towards excellence. Notwithstanding the substantial achievements of 1990, the towering excellence we seek will require many, many years of similar achievements.

Legislation

The new University Council, constituted under the 1989 University Act, took office on January 1. The new members brought a wide range of expertise to Council, thus compensating, in some degree, for the reduction in membership under the new Act. For example, the University was fortunate to be able to use the category of 'Council-appointed' member to appoint Mr Robert Somervaille, an eminent lawyer of wide experience who is also currently the Chairman of the Australian Broadcasting Corporation.

By-law amendments initiated in 1989 were submitted to the Minister for Education. This University anticipated the Minister's plan to simplify all University By-laws following the introduction of the new Acts and had transferred legislation from the By-law to Rules and Regulations: a much more efficient procedure allowing changes to be made by the University Council itself and not, after long delay, by Parliament.

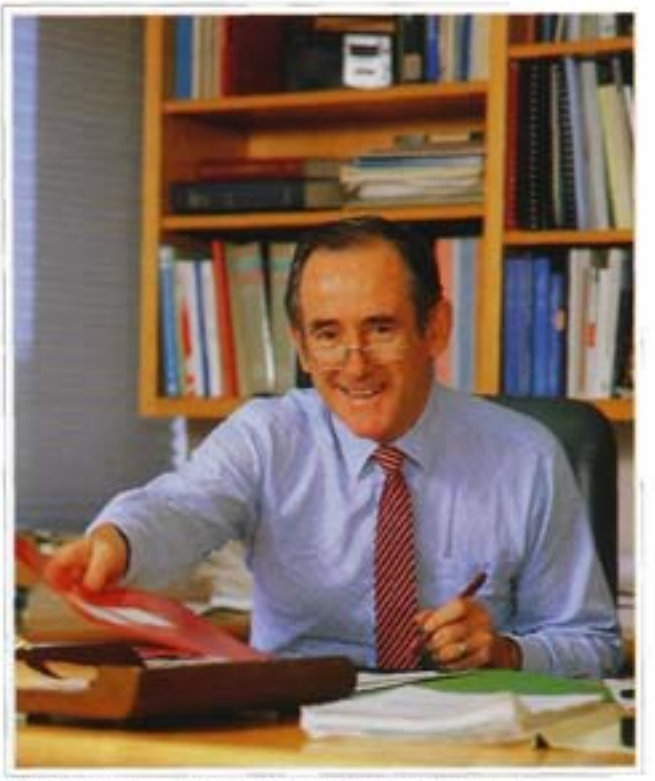
University structures

A basic, additional focus of academic activities was achieved in mid year when research and postgraduate programs were drawn together into a new *Graduate Faculty* within which course development and research will be nurtured, the exchange of ideas and information encouraged and professional postgraduate programs mounted.

The Faculty structure was strengthened with the *devolution* of budgetary responsibility from the central Administration to the Faculty sector. Devolution was an ongoing process during 1990 as Deans and Faculty Committees undertook increasing financial and staff management roles. A guarantee of more realistic faculty attitudes and more accountable practices, devolution is also a pointer to the continuing growth and maturity of the University itself.

The Illawarra Technology Corporation was reorganised during 1990 to allow for more accountable and more effective management structures. The Corporation is the University's technology, research and development enterprise. Its operational divisions were streamlined within the single entity of the Corporation and all were made responsible to a single Board reporting to the University Council.

In April the *Wollongong Conservatorium of Music* was brought decisively within the University structure, thus ending an unhappy period of debate with government officials about the status of a conservatorium which had the misfortune of being located outside the capital city. The University's solution was to bring the Conservatorium into its School of Creative Arts in the Faculty of Arts. We thus not only preserved the full range of its services for the people of the City of Wollongong but also ensured an academic base of research and scholarship to enrich and further its activities.



Deputy Chairman of the Australian Vice-Chancellors' Committee (AVCC) for 1990, the Vice-Chancellor and Principal, Professor Ken McKinnon, during the year was unanimously elected its President. His term of office began on 1 January 1991 and will continue to 31 December 1992. Professor McKinnon is (as is widely known) a former Chairman of the Commonwealth Schools Commission and of the Australian National Commission for UNESCO

Academic developments

Academic activity during the year included the preparation and approval of undergraduate and postgraduate courses for the new Faculty of Law. The Law degrees will be distinguished by a strong clinical emphasis and liaison with other disciplines and the legal profession.

Exciting new proposals were endorsed for offerings in Information Technology and Health Sciences. An interesting development was the joint BA/BCom degree with Japanese as a major study in the Arts component. This course involves study in a Japanese university and marks a diversification of the Department of Modern Languages which until now has concentrated on European languages.

These particular examples give a good indication of the balance in our courses. This University aims for excellence across the board of accepted higher tertiary offerings: we have built a strong reputation in the technologies but not to the detriment of other important fields of scholarship.

Staffing

The Foundation Dean of the Faculty of Law, Professor John Goldring, took up duty in June and two further professorial appointments – Professor David Farrier and Professor Sheila McAllister – were made soon afterwards.

The Foundation Dean of the Faculty of Health and Behavioural Sciences, Professor Christine Ewan, took up her appointment in January and the new Dean of the Faculty of Engineering, Professor Tibor Rozgonyi, arrived in June. Professor Sid Morris was appointed as Dean of the new Faculty of Informatics and he will take up duty early in 1991. Professor Phillip Barter was appointed to head the new Graduate School of Health and Medical Sciences and Professor Phillip Broadbridge accepted a Chair in Applied Mathematics. Professor Fergus O'Brien took up appointment as Professor of Computer Science in September.

Professor Bill Lovegrove, Head of the Department of Psychology, was appointed in July to the important role of leader of the new Graduate Faculty as Dean (Graduate).

These appointments are of high calibre and provide excellent leadership potential for distinctive, new academic ventures.

The University was also pleased to be able to appoint senior professionals able to give the benefit of long and high-level expertise in their fields. Examples are Professor David Greatorex, retired Managing Director of the Capita Financial Group, who was appointed as a part-time Professor in Management and the Honourable Barry Jones, MP, who, in December, became a Professorial Fellow in the Department of Science and Technology Studies.

On the debit side, the University was sorry to lose the services of its Deputy Vice-Chancellor, Professor Ian Chubb. A man of intelligence, humour, and vision, he was largely responsible for the new directions in the management of our research effort. The University was proud, however, that, as one of our executive team, he had been chosen to head the Higher Education Council of the National Board for Employment and Training in Canberra. We were also fortunate to appoint, as our new Deputy Vice-Chancellor in July, 1990, a university leader with a fine record of achievement – Professor Gerard Sutton from the University of Technology, Sydney.

We continued to emphasise and promote policies of staff training and evaluation, restructuring our Centre for Teaching Development to take on a wider role for both academic and general staff as the Centre for Staff Development.

The University endorsed the need for equity in the academic salaries issue and was grateful for the way in which staff tolerated delays in negotiations and continued to serve their students and the University. This issue is testing relationships between the unions and the University but so far they are positive and strong, largely because of staff commitment to the University and the tradition of open discussion.and participation within the University

Student enrolments

Enrolments were on target with a marked increase in students choosing the University of Wollongong as their first preference. The University had a successful mid-year enrolment and its entry 'cut-off' scores were at the same or a higher level than other those of comparable universities.

The University continues to be one of the few universities using the full calendar year for teaching. The Summer Session, run over December and January, has now become a popular part of the teaching year. This feature of Wollongong's academic year not only benefits students but also ensures more efficient year-round use of the University's facilities.

Capital developments

The pace of the capital program in 1990 was again impressive. In the student accommodation area, the second stage of Kooloobong, an up-market residence to the scenic west of the campus, was completed and an older College, Weerona, was substantially refurbished.

Stage II of the Illawarra Technology Centre was occupied and Stage III was nearing completion at the end of the year.

These capital projects were the results, to different degrees, of the University taking the initiative in raising the necessary funds in the absence of government funding.

Other initiatives from loan funding were the extension to the overtaxed Union building and the now-inevitable multi-storey carpark.

With Federal Government funding, the University was able to begin construction of a new Science Building and to bring to near completion, by year's end, a multi-purpose academic building designed to house the Faculties of Commerce and Law. By careful planning the University was able to expand the provision for a lecture theatre into a fully equipped, dual-purpose 450 seat theatre within the building. While the theatre will be used for lectures during the day, its suitability as a music and drama theatre will allow it to be used in the evenings and at weekends by our very active School of Creative Arts.

Finally, but of considerable importance, was the completion, with University and loan funds, of a 50 metre heated swimming pool at the Recreation and Sports Centre. It has already proved extremely popular for activities ranging from children's swimming lessons to the training of Olympic teams. The pool is also a great success for community relations and for improving staff fitness.

Conclusion

The year, then, was one of further gain but not of complacency. The University continued to pursue energetic policies aimed at improving standards of teaching and the quality and drive of its research programs. It did not slacken its efforts to be innovative and exemplary in its activities. It had the confidence to encourage the evolution of a distinctive Faculty of Law. It was unremitting in the development, counselling and evaluation of staff.

A principal goal for 1990 has been to be judged by our peers to be of increasing stature and reputation. This goal is being substantially achieved.

Professor K R McKinnon
Vice-Chancellor and Principal
March 1991

GOVERNMENT OF THE UNIVERSITY

Principal Officers

Visitor
His Excellency the Governor of New South Wales

Chancellor
The Honourable Robert Marsden Hope, AC, CMG, QC, LLB *Syd*

Deputy Chancellor
Brian Somerville Gillett, BA DipEd *Syd*, DLitt

Vice-Chancellor and Principal
Professor Kenneth Richard McKinnon, AUA *Adel*, BA BEd *Q'ld*, EdD *Harv*, FACE

Deputy Vice-Chancellor
Professor Gerard R Sutton, BE, BEngSc *NSW*, PhD *CUA*

Vice-Principal (Administration)
Kenneth B Baumber, BSc *St And*

Vice-Principal (Development)
James W Langridge, BBus *NSWTT*, Dip Tertiary Ed *NE*, MACS

Pro Vice-Chancellor
Professor J Lauchlan C Chipman, MA LLB *Melb*, BPhil, DPhil *Oxf*, Dip Tertiary Ed *NE*

From left, front row: Professor Helen Gamble, Professor Ken McKinnon (Vice-Chancellor), The Honourable Robert Hope AC CMG QC (Chancellor), Dr Brian Gillett (Deputy Chancellor), Mr Ken Baumber (Vice-Principal (Administration), Mrs Susan Chapman

From left, back row: Professor Gerard Sutton (Deputy Vice-Chancellor), Professor J Lauchlan Chipman (Pro Vice-Chancellor), Mr Jim Langridge (Vice-Principal (Development), Mr Robert Somervaille AM, Mr Ron Parker, Associate Professor William Upfold, Mr Stephen Mutch MLC, Mr Chris Downy MLA, Dr Max Lowrey, Greg Butler, Ms Shirley Nixon, Dr Winifred Ward, Mr Rod Oxley, Dr John Panter

(Professors Sutton and Chipman and Mr Langridge are not members of Council but are invited to attend to provide information in their areas of concern. Mr Baumber is Secretary to Council)

The University Council

Elected by the Legislative Council

The Honourable Edward Phillip Pickering, MLC, BSc (Chem Eng) *NSW* (1 January 1990 to 12 September 1990 - resigned)

The Honourable Stephen Bruce Mutch, BA, LLB NSW, MA *NSW* (from 12 September 1990)

Elected by the Legislative Assembly

The Honourable Christopher John Downy, MLA, BA, DipEd *Syd* (from 1 January 1990)

Ministerial Nominees

Brian Somerville Gillett, BA, DipEd *Syd*, DLitt (1 January 1990 to 31 December 1993)

Susan Louise Chapman, DipHealth Admin *Mitchell*, BA, MBA (1 January 1990 to 31 December 1993)

Roderick John Oxley, BBus, AssDip Local Govt Admin *Mitchell*, CPA, FAIM (1 January 1990 to 31 December 1993)

Grahame Morris Parker, BCom *NSW* (1 January 1990 to 31 December 1993)

Ex Officio

The Chancellor: the Honourable Robert Marsden Hope, AC, CMG, QC, LLB *Syd*

The Vice-Chancellor and Principal: Professor Kenneth Richard McKinnon, AUA *Adel*, BA BEd *Q'ld*, EdD *Harv*, FACE

The Chairperson of the Academic Senate

Professor Helen Gamble, LLB LLM *ANU*

Elected by the Students of the University

Daniel Morrissey, BA (1 January 1990 to 31 December 1991)

Elected by Convocation

Gregory William Froggatt Butler, BE, FPWI, PEng (1 January 1990 to 31 December 1991)

Shirley Anne Nixon, BA (1 January 1990 to 31 December 1993)

G Arndt

P C Arnold

P D Bolton

H S Bradlow

Associate Professor Robert William Upfold, BE ME PhD *NSW*, ASTC, CEng, FIE Aust, MIMechE, MAusIMM (1 January 1990 to 31 December 1993)

Dr Winifred Lily Ward, BA PhD (1 January 1990 to 31 December 1991)

Elected by the full-time Academic Staff of the University

Maxwell J Lowrey, ME *NSW*, PhD, ASTC, MIE Aust, MACS (1 January 1990 to 31 December 1991)

John J Panter, BA *Adel*, PhD *NSW* (1 January 1990 to 31 December 1992)

Elected by the full-time General Staff of the University

Ronald B Parker, BA (1 January 1990 to 31 December 1992)

Secretary to Council

Mr Kenneth Baumber, Vice-Principal (Administration) BSc *St And*

Appointed by Council

Robert Duncan Somervaille AM LLB *Syd*

THE ACADEMIC SENATE

Chairperson of Senate

Professor Helen Gamble

Ex-Officio Members

The Honourable R M Hope, AC, CMG, QC Chancellor

Professor Kenneth R McKinnon, Vice-Chancellor and Principal

Professor Gerard Sutton, Deputy Vice-Chancellor

Mr Kenneth E Baumber, Vice-Principal (Administration)

Professor J Lauchlan Chipman, Pro Vice-Chancellor

Mr John Shipp, University Librarian

Mr Gregory J Naimo, Director, Information Technology Services

Heads of Departments

Professor Michael J R Gaffikin, Department of Accountancy

Professor Helen M Garnett, Department of Biology

Associate Professor Graham K Winley, Department of Business Systems

Professor Leon Kane-Maguire, Department of Chemistry

Professor Raghu Singh, Department of Civil & Mining Engineering

Associate Professor Gregory Doherty, Department of Computer Science

R G Castle

S Castles

T Chandra

C D Cook

G Doherty

J E Falk

C Fasano

P Fisher

Mr Robert G Castle, Department of Economics
Professor Chris D Cook, Department of Electrical & Computer Engineering
Associate Professor James M Wieland, Department of English
Professor Murray G A Wilson, Department of Geography
Associate Professor Anthony J Wright, Department of Geology
Professor Edward P Wolfers, Department of History & Politics
Professor Anthony W Parker, Department of Human Movement Science
Professor Brian Moloney, Department of Modern Languages
Professor Julian F Lowe, Department of Management
Professor William J Plumbridge, Department of Materials Engineering
Professor David Griffiths, Department of Mathematics
Professor Peter Arnold, Department of Mechancal Engineering
Professor Sandra Speedy, Department of Nursing
Dr Robert Dunn, Department of Philosophy
Professor Peter Fisher, Department of Physics
Professor William J Lovegrove, Department of Psychology

M J R Griffiths

H Gamble

K Gannicott

H M Garnett

D Griffiths

S C Hill

R Johnston

M Hough

R C King

N Kyle

W J Lovegrove

B Moloney

R McC Lilley

G Naimo

F O'Brien

J Pincombe

W J Plumbridge

L C Schmidt

R N Singh

A C Soyer

Professor G Dennis Calvert, Department of Public Health & Nutrition
Professor James E Falk, Department of Science & Technology Studies
Mr Paul Walton, Department of Sociology

Deans of Facilities

Professor James S Hagan, Faculty of Arts
Associate Professor John C Steinke, Faculty of Commerce
Professor Russell D Linke, Faculty of Education
Professor Tibor G Rozgonyi, Faculty of Engineering
Professor Christine E Ewan, Faculty of Health & Behavioural Sciences
Associate Professor Martin W Bunder, Acting, Faculty of Informatics
Professor John L Goldring, Faculty of Law
Associate Professor Peter D Bolton, Faculty of Science

Dean of Students

Professor Murray G A Wilson

Dean (Graduate)

Professor William J Lovegrove

Heads of Schools

Professor Phillip Barter, Graduate School of Health & Medical Sciences
Professor Barry Conyngham, School of Creative Arts
Professor Carla Fasano, School of Policy & Technology Studies

Professor Ronald C King, School of Learning Studies
Professor Clem Lloyd, Graduate School of Journalism

Heads of Centres

Professor Stephen Castles, Centre for Multicultural Studies
Professor Ron Johnston, Centre for Technology & Social Change

Professors

Professor Günter Arndt, Department of Mechanical Engineering
Professor Hugh Bradlow, Nortel, Technology Centre
Professor Gerald A Freed, Department of Management
Professor Helen Gamble, Faculty of Law
Professor Ken Gannicott, School of Policy & Technology Studies
Professor James M Hill, Department of Mathematics
Professor Stephen C Hill, Centre for Research Policy
Professor Michael Hough, Department of Management
Professor Dudley A S Jackson, Department of Economics
Professor Fergus O'Brien, Department of Computer Science
Professor Lewis C Schmidt, Department of Civil & Mining Engineering
Professor Nicholas Standish, Department of Materials Engineering
Professor Gordon Wallace, Department of Chemistry

Academic Staff Elected by and from the Members of each Faculty

Associate Professor Evelleen Richards (Faculty of Arts)
Associate Professor Gary E Tibbits (Faculty of Commerce)
Associate Professor Noelene Kyle (Faculty of Education)
Dr Tara Chandra (Faculty of Engineering)
Mrs Jan Pincombe (Faculty of Health & Behavioural Sciences)
Dr A Grahame Morris (Faculty of Informatics)
Associate Professor Ross McC Lilley (Faculty of Science)

Student Members

Mr Daniel J Morrissey
Mr Allan C Soper
Mr Frank E Wassman
Mr Joel R Thambipillai
Mr Craig J Wallace

Secretary to Senate

Mr Peter G Wood, Manager, Academic Services Branch

G Tibbits

J C Steinke

S C Speedy

G Sutton

G K Worley

M G A Wilson

E P Wolfers

A J Wright

CHARTER

The University of Wollongong was established and incorporated by an Act of the New South Wales Parliament: 'The University of Wollongong Act, 1972' and commenced on 1 January 1975. An amending Act, 'The University of Wollongong (Advanced Education) Amendment Act, 1982' led to the amalgamation of the former Wollongong Institute of Education with the University.

A new Act, the University of Wollongong Act 1989, came into effect on 1 January 1990.

The aims of the University are contained in Section 6 (i) of the Act, which states that the University shall, within the limits of its resources:

a) provide educational facilities of university standard, having particular regard to the needs of the Illawarra region;

b) disseminate and increase knowledge and promote scholarship; and

c) confer degrees of Bachelor, Master and Doctor and award diplomas and other certificates.

The University is governed by the Council, consisting of ex-officio members (the Chancellor, the Vice-Chancellor and the Chairperson of the Academic Senate), four Ministerial nominees, two members elected by Parliament, one member elected by students, three members elected by academic and general staff, four members elected by the Convocation and one member appointed by Council. There is one major Committee of Council, the Administrative Committee.

The major academic body providing advice to Council on academic matters is the Academic Senate.

MISSION STATEMENT

1. The prime objective of the University of Wollongong is to be strong in both the traditional and new disciplines at both undergraduate and postgraduate levels so as to produce graduates and research outcomes of international distinction and in areas of national importance.

2. The University especially emphasises in its courses and research activities the comprehension, critical evaluation, and application of science and new technologies to industry, commerce and society.

3. The University is committed to increasing excellence through the attraction of increasingly well-qualified students from both within Australia and from overseas. Specific objectives designed to ensure this academic excellence include strong student advice and support arrangements, stringent progress requirements and constant updating of curricula content.

4. The University recognises its special responsibility to the educational needs of its region's population and aims to meet that obligation through arrangements which encourage greater participation in higher education.

5. A broad general education combined with appropriate specific or professional skills will be provided for all students. Research skills, communication skills, computer literacy, skills in logical exposition and competence in the use of statistical concepts will be expected of all graduates.

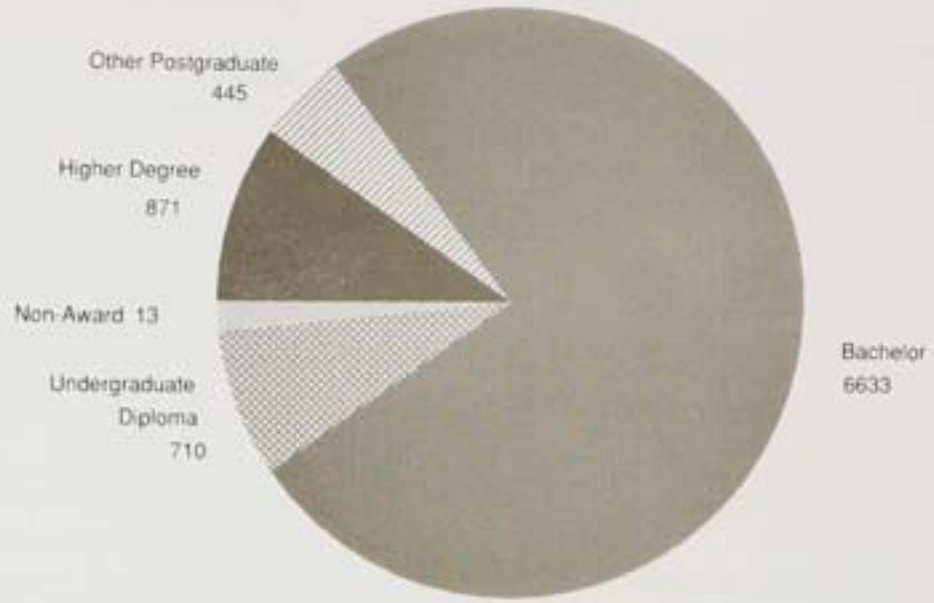
6. High standards of teaching and performance and of research activity, both basic and applied, are encouraged and maintained through staff development, evaluation and guidance programs.

1990

STAFF AND STUDENT STATISTICS

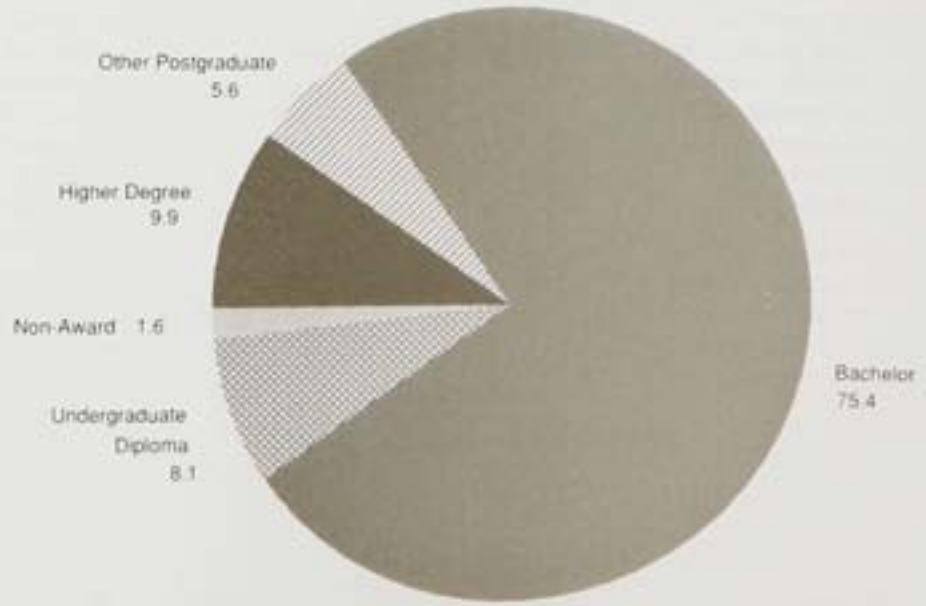
Enrolments in Degrees and Diplomas

Totals

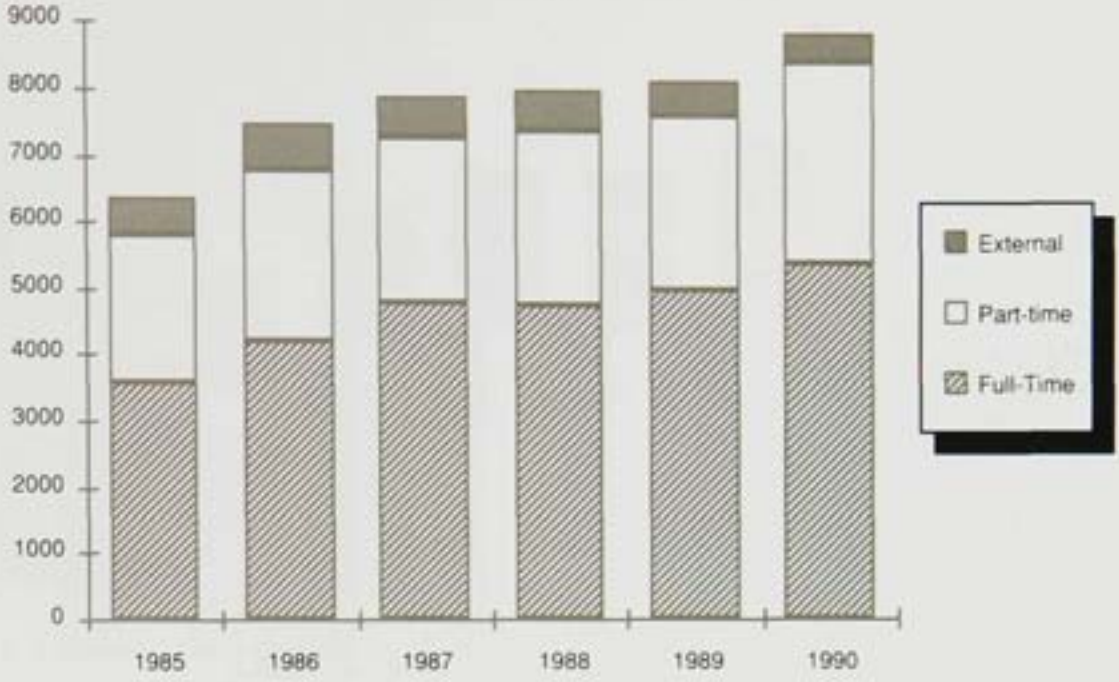


Enrolments in Degrees and Diplomas

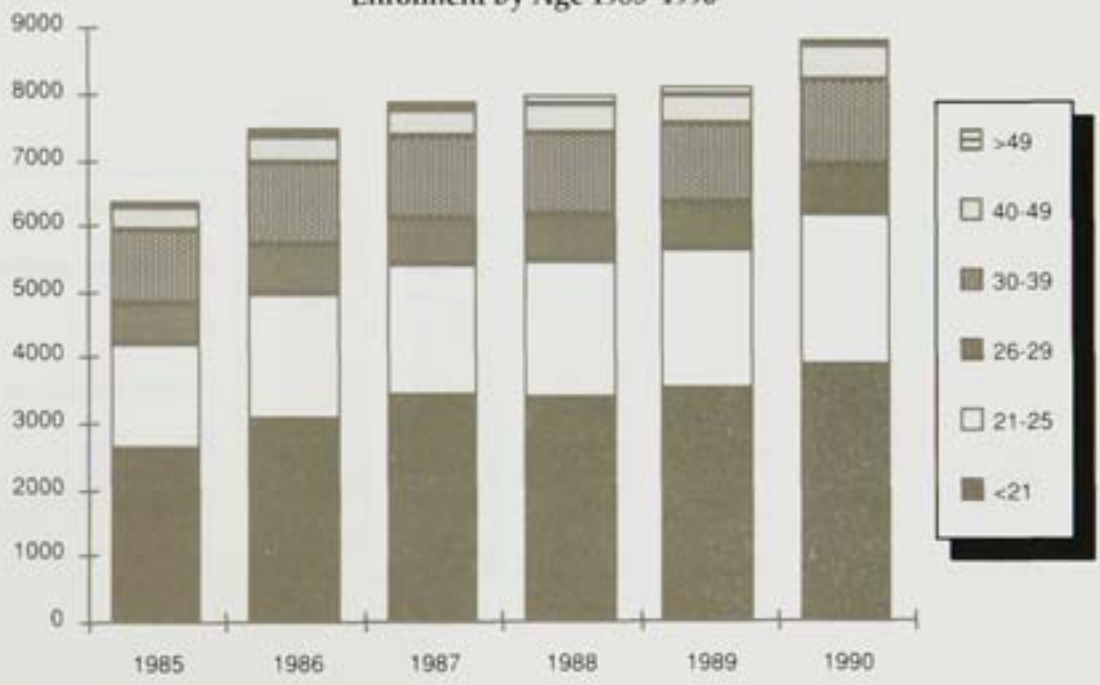
Percentages



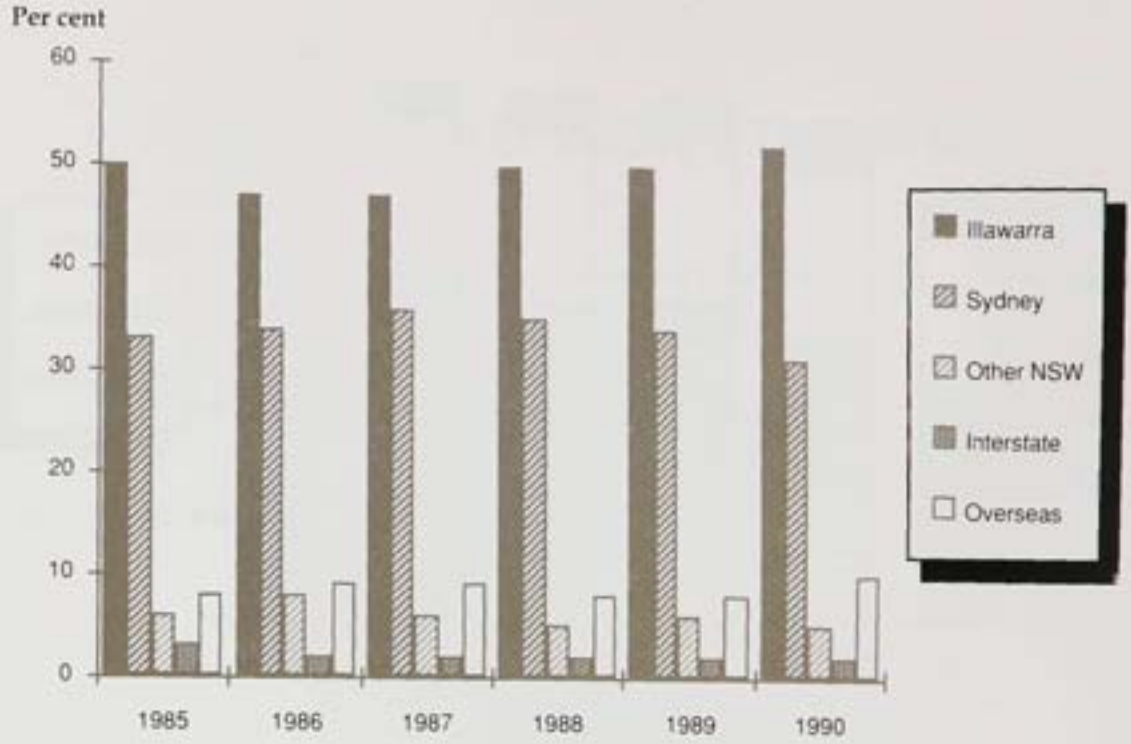
Growth in Student Population 1985–1990



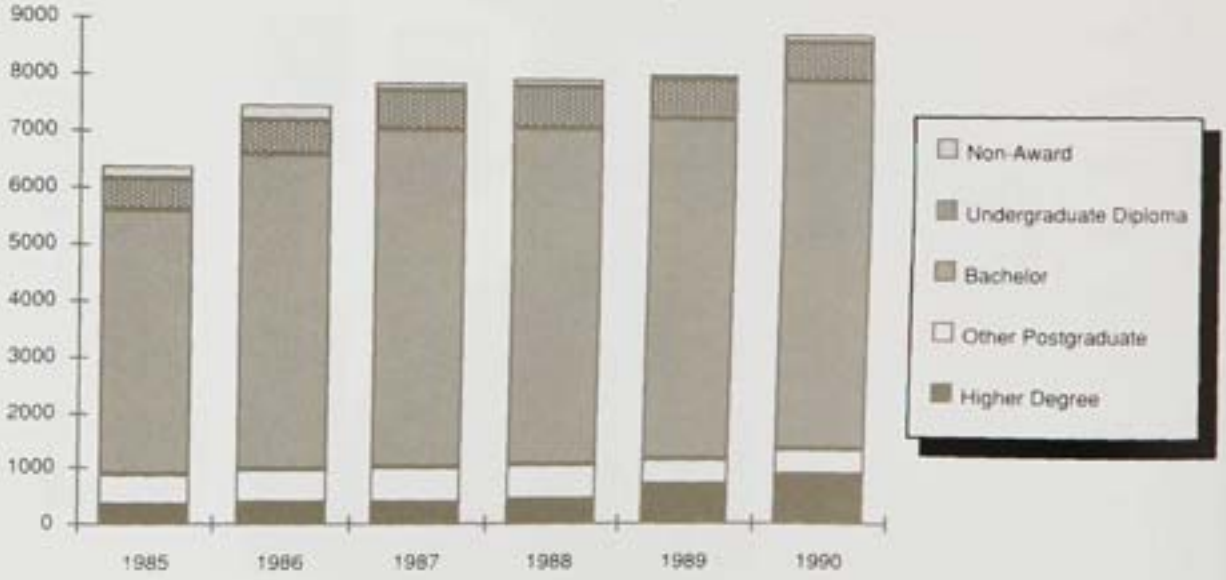
Enrolment by Age 1985–1990



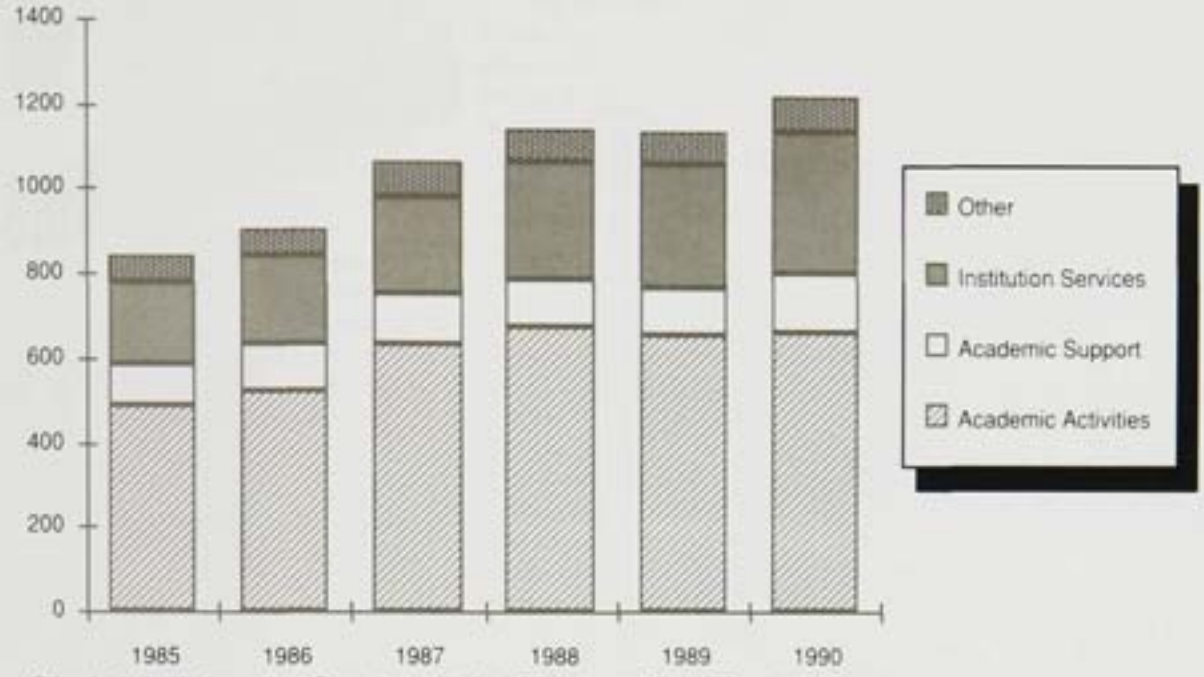
Proportional Enrolment by Region 1985–1990



Enrolment Summary 1985–1990



Full-time and Fractional Full-time Staff



Other includes Independent Operations, Student Services and Public Services

YEAR IN REVIEW '90

distinguished visitors

they came, they saw, they said...

Senator John Button

THE University welcomed many distinguished visitors during the year. In October, the Prime Minister, Mr Hawke, formally launched the Illawarra Regional Consultative Council's Development Strategy. Proceedings were opened by the Council's Chairman, local Member Mr Stephen Martin, who said that in his opinion the University was fast taking the lead among Australian universities. Mr Hawke commented:

'The University of Wollongong is now the second-largest employer in the Illawarra. The Commonwealth has increased its funding for the University by 150 per cent in real terms since 1983.

'But equally, and in a sense perhaps more significant for the future, has been the way in which the University itself embarked on co-operative projects with industry that have generated significant new revenues...that is indeed a very, very great tribute to...the University and does provide a firm basis for the optimistic assertions that Steve Martin has made about your future.'

Senator John Button, the Minister for Industry, Technology and Commerce, also complimented the University on its contributions to industry, in launching a major report for the Federal Government prepared by the University's Centre for Technology and Social Change (TASC). He said:

'In the 1990s we need a more questioning approach to the roles of both government and the private sector and a more appropriate balance between the two. This applies well to technology policy. Getting it right must be a joint

The Prime Minister Mr Hawke

Four for two; on the left is Mr Simon Crean, Federal Minister for Science, and, right, Mr Stephen Martin, local Member for Macarthur

effort by governments, industry, unions and institutions.

'If this report helps us better understand our past – both the successes and the failures – it will help inform the debate on our future.'

Other distinguished visitors during the year included the Italian Ambassador, Dr Francesco Cardi, in May, and the Minister for Science, Mr Simon Crean, in July. Mr Crean inspected the Illawarra Technology Centre and the Science Centre and discussed economic development goals in the Illawarra, the innovation precinct at Campus East, the Illawarra Technology Corporation, science policy, co-operative research centres and the Science Centre.

In December, former Science Minister Barry Jones accepted a special appointment at the University as a Professorial Fellow in the Department of Science and Technology Studies. Mr Jones commented:

'The fellowship gives me an opportunity to use some of the energy that I would have expended as Science Minister. I couldn't help being conscious of how often I'd received invitations to Wollongong to open seminars where they were talking about some new area of industrial development.

'Although a relatively small university, there is an enormous amount of activity here and the area of interest coincides to an uncanny degree with my own interests.'

Technology Corporation (ITC). Notable co-operative advances this year have included:

- The opening of the Key Centre for Mines, a joint initiative of the Universities of Wollongong and New South Wales, by the Minister for Primary Industries and Energy, Mr John Kerin. Covering all aspects of mining, the Centre offers a range of award courses and short course programs and co-ordinates contract research, consulting and market study projects.
- The hosting in January of a five-day conference regarded as the world's most important in its field, Recrystallization '90. Metals and materials experts converged on Wollongong from all over the world; 37 nations were represented by 170 delegates. The conference was opened by Mr Barry Jones, then Federal Minister for Science, Technology and Small Business.
- Establishment in March of a co-operative education program offering

The Italian Ambassador, Dr Francesco Cardi

Above left is Dr Tara Chandra, of Materials Engineering, who in January masterminded Recrystalization '90. The conference was opened by Mr Barry Jones MP, right, who in November joined the University as a Professorial Fellow in the Department of Science and Technology Studies

scholarships donated by industry to outstanding students, involving significant periods of work experience with different employers engaged in a field related to their course and aspirations.

- The announcement in March of another joint research centre for ITC, the result of an agreement between the University and the New South Wales Electricity Commission. The centre's aim is to encourage more efficient use of energy by researching and developing techniques for commercial use by private enterprise.
- In June, the Microwave Appli-

2 co-operation with industry

Relationships have been strengthened

THE University has a history of association with industry, particularly in the Illawarra region. In recent years working relationships have been strengthened and expanded through the Illawarra

Professor Chris Cook, a pioneer of robotic science in Australia, was the major player in the design and development of the computer-controlled tray loading machines for Qantas

cations Research Centre (MARC) combined with the CSIRO Division of Applied Physics and the University of Technology, Sydney, School of Electrical Engineering, in a $500,000 Commonwealth Grant for the use of microwaves in industry. This research project aims to develop a new, advanced process using microwaves for the cost-effective production of rare-earth/transition metal alloys used in the manufacture of high-strength 'super magnets' and other industrial components.

- Also in June, the Automation and Engineering Applications Centre (AEAC), a University engineering company, completed the installation of its major automation system at Qantas, consisting of nine interacting computer-controlled machines which prepare trays of meals used on Qantas's 747 and 767 aircraft.

- A National Centre for Research Policy was established in August, focusing on ways of strengthening national research capabilities to make Australia more economically competitive while safeguarding environmental and social resources. The centre will determine the direction Australia should take in developing research, technology and education strategies in order to achieve the Prime Minister's suggested goal of becoming a 'clever country'.

- In November it was announced that the Australian and New Zealand Association for the Advancement of Science (ANZAAS) would hold its first joint conference, concentrating on the innovative research and development activities of the University and some key local industries within the Illawarra region, at the University in February.

Also in November, senior executives of the Water Board and the Electricity Commission of New South Wales witnessed a demonstration of a revolutionary recycling process called Env-IRONment (*sic*) and developed by Professor Howard Worner and his team at ITC, using sewage sludge and steelworks dust to produce marketable foundry iron and pigment zinc oxide.

3 local links

Pioneering progress in the Illawarra

AS the Prime Minister observed in October, the University of Wollongong is now the second-largest employer in the Illawarra. But it is involved much more widely and deeply with the region through co-operative developmental activities. There have been many notable pioneering initiatives of this kind this year.

In January, the Department of Electrical and Computer Engineering ran an introductory course in electrical and computer engineering for Year 10 students. Highlight of the course for most of the 26 participants was the construction, testing and taking home of an analogue multimeter. Most students came from local high schools although some came from farther afield: Canberra, Goulburn, Yass and Nowra.

Right: on a shade less-exalted plane than that of Professor Cook, David Webb, working as an apprentice in the University's Maintenance Section, achieved the highest mark in the final year of his TAFE course and won an award from the Illawarra Division of the Master Builders' Association

In May, the final year of one young student's three-year carpentry/joinery course at Wollongong TAFE ended in winning a TAFE trophy and two awards for outstanding achievement. David Webb had been studying one day a week at TAFE while working his four-year apprenticeship under the supervision of Paul Attard in the University's Maintenance Section at Campus East.

In September, Associate Professor Neville de Mestre, from the School of Information and Computing Sciences at Bond University, presented a talk to the Department of Mathematics on 'Computer Ecology and Chaos'. Many of the audience came from local high schools.

▲ *A visiting mathematician, Professor, Neville de Mestre from the Bond University, right, with Professor Jim Hill of the Department of Mathematics*

◀ *Addressing the Conference of University Administrators at the University of Exeter in March, Mr Jim Langridge, Vice-Principal (Development), reviewed the restructuring of tertiary education in Australia*

4 University news

Achieving national and international prominence

MANY familiar faces on campus gained national and international prominence during the year, through their academic and research achievements. Mr Jim Langridge, Vice-Principal (Development) was invited, in the light of developments at the University, to review the restructuring of tertiary education in Australia. In his address in March to the Conference of University Administrators at the University of Exeter, in England, Mr Langridge explained how recent changes have aided this University's developmental goals, largely thanks to its earlier willingness to make innovative decisions, establishing a viable, commercially orientated technology development operation through the formation of strategic alliances with business and industry.

In May, physics lecturer Glen Moore was awarded the Ethel Hayton Award

Founder of the University's Science Centre at Campus East, Mr Glen Moore won the Ethel Hayton Award, donated by the Friends of the University for major work between the University and the community. Presenting the award is the Chancellor, the Hon RM Hope AC CMG QC

In August, Dr Evelleen Richards, of Science and Technology Studies, was elected to the Council of of the USA-based Society for Social Studies of Science

for his initiative in forwarding the establishment of the University's popular hands-on Science Centre, which is familiarising the community, and in particular the schools of the region, with technological applications of scientific theory.

An exciting event on campus occurred in June with the introduction of full-colour printing in the University Printery. From a modest duplicating service, the Printery has grown with this development to a substantial quality department able to offer numerous services both inside and outside the University.

In August, Associate Professor Noel Kennon, of the Department of Materials Engineering, received an Honorary Fellowship of the Institute of Metals and Materials Australasia (IMMA) for his outstanding contributions to the Institute. In the same month, Dr Evelleen Richards, of the Department of Science and Technology Studies, was elected to the Council of the USA-based Society for Social Studies of Science.

A nine-month Fulbright Scholarship at Keene State College, in the United States, was won in October by the Senior Research Fellow in the Centre for Multicultural Studies, Mary Kalantzis. It was the first time this prestigious type of Fulbright award has gone to an Australian. It was won against strong competition in English-speaking countries.

Also in October, Alumni Officer Juliet Richardson was elected junior vice-president of the Australian University Graduate Conference (AUGC); Wollongong University's first woman Doctor of Civil and Mining Engineering, Monica Bufill, graduated; and the Chancellor, the Hon R M Hope, AC CMG QC, officially opened the University's second collegiate hall of residence, Weerona College.

And a third...Alumni Officer Juliet Richardson was elected junior vice-president of the Australian University Graduate Conference

Another woman member of academic staff to be honoured was Senior Research Fellow Mary Kalantzis, with the award of a Fullbright Scholarship to Keene State College in the USA

5 art, music and sport

An eventful year

CLIFFORD Frith, Artist in Residence in the School of Creative Arts, completed his residency in May. A major exhibition of his work at the Irving Gallery in Sydney aroused great interest with its use of natural materials, including slate, granite and stone, balanced with neon lights.

In September, BHP Steel officially presented the BHP Youth Orchestra with a sponsorship cheque at the Wollongong Conservatorium of Music. In the following month, the appointment was announced of Keith Hempton as lecturer in charge of the Conservatorium, his work being divided evenly between the Conservatorium and the School of Creative Arts. His tenure was marked by an Open Day in November.

On November 26, spotlighting on Bert Flugelman's Lawrence Hargrave sculpture, commissioned by the Friends of the University, was switched on. Wollongong City Council aldermen and other dignitaries were invited to join in a public tribute to Lawrence Hargrave. Other events of the night included hang-gliding displays, exhibitions by students of the School of Creative Arts and musical recitals. Several thousand people visited the campus for the occasion.

And in June the Wallabies trained in Wollongong before defeating France in the first Ricoh Test at Sydney Football Stadium.

Spot-lit for the first time in November was Bert Flugelman's stainless-steel memorial to the great Australian pioneer of flight, Lawrence Hargrave. The statue was commissioned (and partly paid for) by the Friends of the University

6 global participation

Increasing overseas links

SO cosmopolitan has the University become in its staff, students and activities that no month has passed without an event involving overseas links. In May, for the third year running, the Department of Accountancy was represented at the European Accounting Association's Annual Conference, this time held in Budapest. Three members of staff participated. In October, the University's existing formal links with overseas universities were expanded by finalisation of similar agreements with other institutions in the United States, the United Kingdom and Europe.

Reports from Faculties

Academic Activities

Faculty of Arts

DURING the year, the Faculty of Arts implemented its plan to develop postgraduate studies in journalism. It also gained approval for a joint degree involving Japanese and commerce, for a postgraduate course in cultural studies and for a major study program in resource and environmental studies. These developments demonstrate areas of interdisciplinary study that have been planned to meet demands in these areas. The Faculty also co-operated with the newly established Faculty of Law; a joint degree in Arts/Law will be offered from 1991.

In January Professor Barry Conyngham, noted composer and conductor, joined the Faculty of Arts as Head of the School of Creative Arts. He has in addition accepted the position of Director of the Conservatorium of Music

The Graduate School of Journalism was established in temporary accommodation in the Illawarra Technology Centre in April. The initial courses were taught by Foundation Professor Clem Lloyd during the second session of the academic year. Over a full year the total number of full-time and part-time students enrolled is expected to be approximately 50. Several overseas students applied to begin the course in 1991. There were also several inquiries about PhD and MA (Journalism) studies by thesis. Despite the structural problems in the Australian media industries, the school has attracted a high level of interest; a consistent level of demand through the establishment years seems assured.

The school is developing a research program directed in its early phases to the history and practice of Australian journalism, and public attitudes to journalists. Preliminary discussions have also been held with publishers about the preparation of a series of basic text books in journalism and other teaching resources.

In time for the first session of 1991, the school moved to new accommodation. This will house the school's newsroom equipped with Macintosh personal computers and facilities for teaching electronic media journalism and print

The Australian Press Council's public forum to discuss press ethics was held at the University at the end of October. Seen here is the forum panel. From left Professor David Flint, Dorothy Ross, Professor Clem Lloyd of the University's Graduate School of Journalism, who chaired the forum, Mr Peter Newell and Mr John Brown

A PhD student in the Department of Science and Technology Studies, Ann Dugdale, facing camera, during the year embarked on a nine-months' study in the USA. Recipient of an international fellowship by the American Association of University Women, she is studying the controversial IUD at the Johns Hopkins University School of Hygiene and Public Health. On the left is Dr Eveleen Richards who, together with Dr Brian Martin, worked with Ann on her research at Wollongong

publication. Ms Alison Ray, a former senior producer with the ABC and Granada TV in the United Kingdom, has been appointed to the lecturing staff. Another lecturer and a part-time technical officer were appointed in time for the start of teaching in 1991.

The Department of Modern Languages received grants from the National Priority (Reserve) Fund for curriculum development in Japanese and for the promotion of Indonesian. In association

Brian Moloney, Professor of Italian and Head of the Department of Modern Languages, carries an ever-increasing workload. A grant has been received from the National Priority (Reserve) Fund for curriculum development in Japanese and the promotion of Indonesian. A three-year sequence in Spanish is in the planning stages

Clifford Frith ended his period as artist in residence at the end of May. During his stay Mr Frith shaped a figurative sculptural piece which included the use of neon lighting

Upper right: NSW Opposition leader Bob Carr (right) with Walter Tonetto, editor of Earth Against Heaven, *an international anthology of poems published by the University's Five Islands Press which was launched at Parliament House in October. The book is a response by major poets to the June 1989 Tiananmen Square massacre of students and pro-democracy protesters*

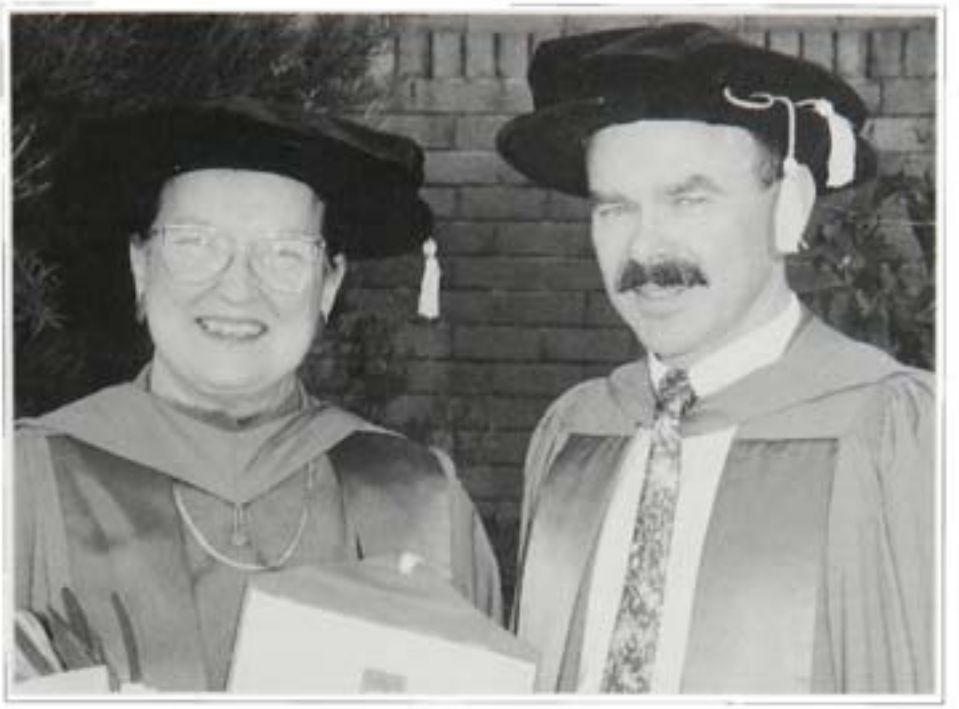
with the Faculty of Commerce, the Faculty of Arts introduced a five-year joint degree in Arts and Commerce, with Japanese as the Arts major. This course, which includes study in Japan, is innovatory and it is hoped that it will serve as a model to other institutions. During the year the Department of Modern Languages also made plans, with the help of the Spanish government, to introduce for the first time a three year sequence in Spanish.

Also during 1990 the Faculty introduced a major study for the Arts degree in Resource and Environmental Studies, to be offered in 1991. It is a multi-disciplinary major built on existing subjects in the areas of economics, geography, history, politics, philosophy, science and technology studies, and sociology.

Currently there is both an interest in and a need for analysis of resource and environmental issues from a social science perspective. The major study in Resource and Environmental Studies will meet this need and assist many of those joining the workforce, in industry, government or education, who will confront environmental issues as social issues, not as technical issues. The major will also cater for students with an intellectual or personal interest in pursuing the wider economic, political, social and ethical aspects of environmental issues.

Associate Professor Jim Wieland, as Head of the New Literatures Research Centre in the Department of English, played a leading role in the 1990 conference of the South Pacific Association of Commonwealth Literature and Language Studies held at the University

At the post-graduate level, a new Master of Arts course in Cultural Studies was jointly planned by the Departments of English and Sociology. The course, to begin in 1991, will draw also on teaching expertise in the Centre for Multicultural Studies and the Department of Science and Technology Studies. It is hoped that the inter-disciplinary nature of the



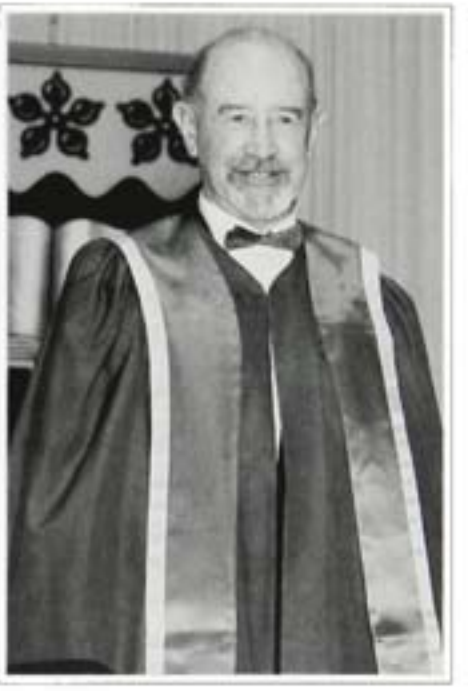
At the May graduation ceremony: Irene Amos, Australia's first woman Doctor of Creative Arts, is photographed with Dr Peter Shepherd who in 1988 became the first ever to take the degree of Doctor of Creative Arts at this University

program and its focus on theoretical, critical and practical analysis of contemporary society will make it unique and at the forefront of contemporary discussions of culture.

The 1990 Commonwealth Writers' Prize was administered by Dr Paul Sharrad, from the Department of English. It was awarded to Mordecai Richler.

In January, the New Literatures Research Centre established by the Department of English hosted the annual conference of the South Pacific Association of Commonwealth Literature and Language Studies. The gathering attracted academics and writers from Australia, the Pacific, USA and Canada. The Department received Australia Council sponsorship for the Australian writers Margaret Scott, Nigel Krauth and Jeff Guess to speak at the conference.

In January, Professor Barry Conyngham joined the Faculty as Head of the School of Creative Arts. He has defined the unique aspects of the School as '... the development of skilled artists in theatre, music, creative writing and visual arts within a climate of interaction and interdisciplinary exchange'.



At the October graduation ceremony Bert Flugelman, retiring Senior Lecturer in the School of Creative Arts, was awarded a Fellowship in recognition of his services to the arts

In addition, he accepted the position as Director of the Conservatorium, which is now part of the School of Creative Arts. It is hoped the scope and range of Conservatorium teaching will be expanded as a result of this and other changes.

Faculty of Commerce

GROWTH was again the keynote in 1990. Demand for the Bachelor of Commerce and some postgraduate courses far exceeded available places. The result was that despite the number of enrolments, the Faculty's entry standards were among the highest in the University. Enrolment of almost 1500 Bachelor degree students and over 200 at the Associate Diploma level, together with 370 postgraduates, represents a significant contribution to the University's impressive growth record. During 1990, Commerce accounted for approximately two-thirds of the University's growth in both total enrolments and international enrolments; this is demonstrated by the table

	Spring 1989	Spring 1990	1989-90 Growth
Commerce total EFTSU	1540	1945	405
Commerce full fee EFTSU	181	338	157
University total EFTSU	6411	7028	617
University full fee EFTSU	273	499	226

Distinguished guest lecturer to the Department of Business Systems was Professor Christian Nöll from the University of Kiel in Germany. During his stay he conducted seminars and lectures on such themes as stochastic models of learning, business productivity tools and expert systems

Commerce students now account for some 27 per cent of University enrolments at undergraduate level and over 20 per cent at the postgraduate level.

International programs likewise expanded. Students from overseas now comprise approximately one fifth of Commerce EFTSU. A number of our students also took the opportunity to study in the United States on exchange programs, while under reciprocal arrangements American students came to Wollongong from various universities. Studying alongside international students necessarily benefits our domestic students by broadening their cultural experience. For our students, the well-articulated agreements which give them the chance to study abroad represent an agreeable bonus of studying at this University.

A specialisation in Marketing within the Bachelor of Commerce was developed and created a great deal of interest. This major aims to emphasise analytical and quantitative skills, so that students are equipped to conduct meaningful market research and implement effective strategies for marketing products and services. This should prove a popular choice for those contemplating any of a wide range of careers. The introduction of this course is felt to be another instance of the Faculty's anticipation and appreciation of the workplace needs.

In Accountancy, a departmental initiative was the establishment of a computer laboratory customised for accounting study. The laboratory has proved extremely useful, alike for students and staff. It was partially funded by the Faculty, with the Department of Accountancy providing the expertise to assist users with specialist applications.

Software skills were also the focus of a joint venture, in this case between the Department of Business Systems and Illawarra Electricity, which consulted

the Department for help in developing an automated billing system. Another consultancy on project scheduling for a local company was also won by this Department.

The Master of Business Administration degree received a state plaudit when one of our students was judged in an open competition the most outstanding of all MBA students from business schools throughout New South Wales. Bruce Cox received the award for overall performance in the degree, and in particular for his final-year thesis on Information Systems in a Total Quality Control environment. A record number of enrolments in the MBA in 1990 underlines the fact that the Department of Management is fulfilling a community need.

Faculty was privileged to obtain the services of a number of eminent academics. They joined existing staff to make our teaching and research team among the best-qualified in the country. The variety of international backgrounds of staff is a great asset to students seeking cross-cultural knowledge or research topics.

Research activity was strong throughout 1990. A number of stimulating and well-received seminars were conducted by staff, postgraduate students and visiting academics in all departments.

Prestigious visiting research fellows likewise collaborated with staff in all departments to foster research at an international level. Business Systems was privileged to receive as visiting fellow Fulbright Scholar Dr Karen Forscht, an expert in Management Information Systems from James Madison University. Two other leading academics from Kiel in Germany were working on the use of information systems in agricultural economics.

Planning for the Faculty's move into a newly constructed building reached a peak towards the close of the year. Members were keenly anticipating the more convenient access promised by the move to facilities such as computer laboratories and special-purpose teaching rooms.

A Marketing major was planned during the year by the Department of Management for introduction in 1991. Course organisers, pictured here, are director, Paul Patterson, and Constance Hill

Associate Professor Graham Winley, Head of the Department of Business Systems, with Mr Warren Greentree, General Manager of Illawarra Electricity, which is to use specialist computer software, designed in the University, to streamline the corporation's customer information system

Faculty of Education

Professor Anne Mellor, a visitor from the University of Los Angeles, conducted a seminar dealing with the intersections in the life of a biographer and the subject of the work. The seminar was organised by the School of Learning Studies under its Equity in Education program

DURING the year the Faculty initiated a review of its pre-service teacher education and postgraduate programs to rationalise and consolidate existing course and subject offerings. The aim of the review was to enable more effective responses to be made to changes in market demand and in State and Federal government decision-making on education issues. In addition, the Faculty made a number of resolutions about subjects and courses on offer, and issues affecting the future direction of the Faculty's pre-service teacher education and postgraduate programs.

Resource and logistic issues, which included low student intake levels into the Bachelor of Education (Secondary) courses and difficulties in arranging practice teaching sessions, resulted in the Faculty reviewing the feasibility of continuing to offer these courses.

After considering the issue the Faculty resolved that there would be no new intake in 1991 into the Bachelor of Education (Secondary) Mathematics, Bachelor of Education (Secondary) Science and Bachelor of Education (Secondary) English/History. An intake in subsequent years would be subject to further consideration.

As part of the phasing-out of the Faculty of Education's involvement in external studies education there was a final intake of students into the Bachelor of Education (Primary) Bridging course and the Diploma in Teaching (Primary) Conversion course. In addition, 85 commencing students were enrolled in the external Bachelor of Education (Conversion) program. The Faculty investigated the introduction of a course, in off-campus or extended campus mode, for those teachers with a three-year Diploma in Teaching who wish to upgrade to a four-year Bachelor of Education.

As a result of decisions concerning the Bachelor of Education (Secondary) programs, the phasing-out of external studies courses and a review of undergraduate subjects that did not meet the University's recommended minimum enrolment levels, the Faculty agreed to the deletion of 24 subjects from the Education Schedule and ten subjects from the Arts Schedule in the 1991 University Calendar.

Currently, students in the Illawarra region wishing to obtain an early childhood teacher training qualification travel to courses in Sydney, Canberra, Newcastle, Bathurst or Wagga Wagga. The only early childhood course on offer in the Illawarra is an Associate Diploma level course in child care conducted by TAFE Colleges in Wollongong, Moss Vale and Nowra.

Research undertaken by staff in the Faculty indicated that the introduction of an early childhood strand within the Diploma in Teaching/Bachelor of Education program would provide the Faculty with a substantial and continuing supply of students. Given that the Faculty would experience a decline in student numbers from 1990 with the phasing-out of most of its external education courses, the introduction of an early childhood specialisation would provide an opportunity for the Faculty to maintain its current level of student enrolments in programs more closely affiliated with its existing pre-service teaching programs.

The Faculty resolved that the establishment of a pre-service program in early childhood education within the Faculty of Education, to be closely associated with the Diploma in Teaching and Bachelor of Education (Primary) programs, would be accepted in principle and that the development of a detailed course proposal in this area would proceed with a view to its introduction from the beginning of 1992. A working party was established to develop this proposal.

Head of the School of Policy and Technology Studies in Education is Professor Carla Fasano (middle). Conferring with her are, left, Tonia Gray, and Gregg Rowland

The Faculty developed an integrated Bachelor of Arts/Graduate Diploma in Education program and an integrated Bachelor of Science/Graduate Diploma in Education program for prospective secondary school teachers to begin in 1991. Practice teaching sessions in these courses would occur in a six-week block in the fifth session of the course (first session in the year) and a further six-week block in the eighth session of the course (second session in the year).

The end-on Graduate Diploma in Education was also restructured so that the first session of that course corresponds with the fifth session of the integrated course and the second session with the eighth session of the integrated course. It was expected that convergence of these two course structures would provide appropriate resource economies for the Faculty, while simultaneously improving the quality of the courses.

A proposal currently under consideration in the Faculty concerns the development of a specialisation in the Graduate Diploma in Education in adult education/industry training.

During March, the Faculty resolved to work towards the establishment of a Graduate School of Education which would be responsible for the management of all post experience graduate programs in the Faculty. The Faculty subsequently established a Graduate School of Education Planning Committee to formulate policies and procedures for the Graduate School.

The Planning Committee also began reviewing and restructuring the Faculty's postgraduate courses, with existing subject offerings and specialisations in the Master of Education being reorganised into the postgraduate program areas of Curriculum, Language and Learning and, Policy and Planning. The Faculty also introduced a Teaching English as a Second Language specialisation in the Master of Education.

In addition to reviewing undergraduate and postgraduate subjects and courses during 1990, the structure and organisation of the Faculty was examined. A decision was taken that, from 1 January 1991, the Faculty of Education would operate as a single organisation unit for resource allocation and planning purposes and that the two present Schools of the Faculty would cease to exist.

This new structure would allow informal groupings of staff within the Faculty to be established on grounds of common interest for teaching, research and other relevant purposes and foster the development of a cohesive Faculty identity.

Faculty of Engineering

On his third visit to the University, Professor Du Hegui, from Shenyang, China, is seen here with Professor Nick Standish of the Department of Materials Engineering. The camera interrupted their examination of an ingot of iron produced at the Microwave Applications Research Centre from steelworks dust and sewage sludge

THE YEAR 1990 saw significant developments within the Faculty of Engineering. The Faculty strengthened its links with industry and developed new initiatives to increase its capabilities in the areas of research, consultancy and teaching.

Numerous industries are now benefiting from the advantages of pneumatically transporting bulk solids through pipelines (eg, totally enclosed method of transport, hygienic operation, flexible routing, ease of automation).

Three introductory courses on pneumatic conveying have been run since 1985. In response to a questionnaire from the Faculty, circulated at the last course in July 1989, several industries expressed an urgent need for a more detailed design course. What they sought was training and hands-on experience in the areas of design, hardware selection, problem solving and new technology (eg, low-velocity transportation of fragile food products).

In the Department of Mechanical Engineering, Dr Elias Siores has initiated a project on routine orthopaedic surgery. Using Intelligent Robots and Ultrasonic Sensors, the project has attracted a team of renowned scientists. Equipment and software to the value of $100,000 have been allocated for it. And real-time expert systems for adaptive control during robotic surgery will be employed, together with ultrasonic sensing and/or other non-invasive sensing techniques. The project has generated a great deal of international interest.

In the area of artificial intelligence and neural network applications in robotic surgery close collaboration with Professor S Tzafestas (Intelligent Robotics and control of the National Technical University of Athens) has already been established. A prototype system working on models is expected to be completed within two years.

New Dean of Engineering and a Professor of the University is Tibor Rozgonyi. Before his appointment he was Director of Coal and Lignite Research Laboratories at Texas A & M University. He has a distinguished record in both research and administration

The Key Centre for Advanced Manufacturing and Industrial Automation (CAMIA) has continued to grow in strength and has been instrumental in organising the pooling of resources within the Faculty and with the Department of Electrical and Computer Engineering and the Automation and Engineering Applications Centre (AEAC).

A very successful Fifth Institution of Engineers Australia International Conference on Manufacturing Engineering (ICME-90) was held at the University of Wollongong in July. One hundred papers were presented to over 200 delegates, approximately 90 of whom came from industry. A major feature of the conference was the first public demonstration of the joint 'ACME' Flexible Manufacturing System, which is now fully operational.

The Faculty is placing more emphasis on computer applications for each stage of the undergraduate programs and, to

The Manufacturing and Engineering Conference, held at the University in July, attracted some 200 delegates and guests from many parts of Australia. A feature of the three days of activity was a demonstration in the Illawarra Technology Centre of the Flexible Manufacturing System

enhance that emphasis, the Faculty is developing its own Engineering CAD lab, and has purchased 22 SUN 3/80 work-stations with high-resolution 19 inch colour monitors for the CAD lab to be operational by early 1991. It is hoped that this will be the first stage in upgrading the Faculty's manual drawing-office facilities to state-of-the-art computer-aided design equipment. The lab will include printing and plotting facilities and, at a later date (subject to technical and financial constraints), projection equipment enabling the lecturer to demonstrate and project on to a whiteboard directly from one of the workstations. The lab will thus facilitate the integration of computing into all facets of the engineering course. Students can expect to be exposed to – and to develop a proficiency in – computing well beyond what is possible with present resources.

The workstations will be connected by two fileservers to the Campus Area Network and provide students with all the usual UNIX tools. This lab will have CAD and productivity software available to all students of the Faculty.

The hardware configuration selected will enable students working with

Also at the conference – Mr Ross Robinson, Assistant General Manager of BHP Slab and Plate Products (left), is seen with Professor Günter Arndt

AutoCad to save their drawing files on to floppy disks in MS DOS-compatible format and be able to read them elsewhere on either an MS DOS compatible computer or an Apple Macintosh.

In order to increase the numbers of female enrolments in engineering, the Faculty has increased its activities in schools liaison and support for the Women in Engineering Network, a group of female engineering students

Mechanical Engineering students, Craig Croxton, left, and Craig Pilt, were prize winners at 'a thesis presentation night' conducted by the Society of Manufacturing Engineers in Sydney. Pilt was awarded second prize and Croxton was third

who meet once a month to offer support and assistance to each other in what has traditionally been a male-dominated area. It was especially uplifting to have its first female PhD graduate in the Department of Civil and Mining Engineering. Ms Monica Bufill received her doctorate in the Civil Engineering discipline with her thesis entitled 'Effects of Urbanisation on Floods'.

The Faculty has recognised that presentation and communication skills are of vital importance to graduates of today. In the Departments of Materials and Mechanical Engineering, a range of innovations to boost training in this area, both qualitatively and quantitatively, have been introduced. Students are required to make seminar-type presentations throughout their training.

In the Department of Mechanical Engineering, the starting point is in the first-year of enrolment with the Annual Creative Design Competition, the finals of which are judged by academic and industrial experts at a formal function. In their final year, the students make a seminar presentation to the academic staff on their final-year theses. Many other subjects also incorporate oral presentations as part of the formal assessment.

This is not all. A series of half-day workshops for all final-year mechanical engineering thesis students was introduced. These workshops make extensive use of the Departmental video recording facilities to give students immediate feedback on oral presentations. For example, a group of students may be asked to simulate a real-life managerial situation, say, a boardroom meeting; they have to give one-minute summaries of their technical projects. Students are also required to make seminar presentations on their thesis topics. On playback of the video recordings, each student is encouraged to criticise constructively his or her own performance and those of other students. Feedback from students indicates the course to be most successful, as does the improved standard of performances in the formal thesis oral presentations.

The Faculty of Engineering now comprises three departments: Civil and Mining Engineering, Materials Engineering and Mechanical Engineering.

The decision to transfer the Department of Electrical and Computer Engineering to the Faculty of Informatics meant that, in terms of size, the Faculty was the smallest in the University. But it is hoped that this new administrative

Previous winners of the students' Creative Design Competition are seen here with their winning entry – a device to enable physically handicapped school children to be lowered into and raised out of swimming pools. The model was used as a prototype for a professionally finished job in the workshops of BHP's Slab and Plate Products Division and installed at Parameadows School for Specific Purposes. The headmaster of Parameadows School, Mr John Hobson, is in the middle of the picture

reorganisation will provide a more flexible arrangement, emphasising the importance of telecommunications and information transfer systems.

As in previous years, the Faculty was successful in attracting outside funding from the Federal Government and agencies which can be considered highly successful when the size of the Faculty is taken into account. The Faculty would like to continue its emphasis on applied and industrial research activities making the maximum possible use of both its equipment and intellectual capacity. This activity will be through an Experiment and Extension Service that will be co-ordinated closely with the Illawarra Technology Corporation, the University's industrial arm. This will assist in identifying and conducting R & D in technical areas that are critical to the Illawarra, to New South Wales, to the nation and to the international community. It will also assist business and industry by advancing technology and helping to develop appropriate applications for this new knowledge.

The University and the Faculty both realise the finite possibility for federal funding in the future. Further development and extension will therefore be assisted through these new concepts of industry and university activities, in addition to – it is hoped – providing industry chaired positions.

Associate Professor Noel Kennon of the Department of Materials Engineering was awarded an Honorary Fellowship of the Institute of Metals Australasia for his outstanding contribution to the Institute. His involvement spans 28 years

With the arrival of a new Dean of Engineering, Professor Rozgonyi, from Texas A & M University, this new phase of change and development for the Faculty will advance rapidly.

Faculty of Health and Behavioural Sciences

THE Faculty of Health and Behavioural Sciences was formed in January. As well as maintaining undergraduate and postgraduate programs in nursing, nutrition, community health, human movement science and psychology, it will be introducing from 1991 a new range of programs including a Bachelor of Science in Biomedical Sciences, a Bachelor of Arts in Health Studies and interdisciplinary graduate programs in Public Health and Health Policy and Management.

A highlight of the Faculty's recent activities has been the formation of the Graduate School of Health and Medical Sciences for the promotion of graduate coursework and research programs. The other major activity has been the enhancement of functional links with the local area health authority. Conjoint appointments and educational and research programs now exist in each discipline area within the Faculty and a Joint Planning Committee for Health Services, Education and Research in the Illawarra has been established to formalise that collaboration.

Head of the Department of Public Health and Nutrition is Professor Dennis Calvert. His aim: to strengthen multidisciplinary health promotion and disease prevention and to research and mount new initiatives in Australia

The Joint Planning Committee is the main vehicle for the development of a University of Wollongong-Illawarra Area Health Service teaching complex. The Committee is chaired by Senator Peter Baume and its members include the NSW Director-General of Health, the State Manager of the Department of Community Services and Health, the Assistant Secretary, Health Promotion and Development, Department of Community Services and Health, the local Member of the House of Representatives and senior representatives of the University and health service.

The terms of reference of the Committee include:

- To plan for the Illawarra to become a model, with implications for State and Federal strategies, for health care based on an effective integrated service extending from primary prevention through tertiary care.
- To identify the complementary training and education, for health-care personnel and for the public, and the research roles of the University of Wollongong, the Illawarra Area Health Service and the NSW and Commonwealth Departments of Health in implementing the plan.
- To produce a written plan for the cooperative development of health services delivery, education, research and training which will serve as a model, the plan will include:

specific targets for the development of educational and research programs;

particular projects (eg mental health staff retraining; development of indicators for evaluation of services; health policy research unit) which must be undertaken, jointly or on a contract basis, with the Departments of Health;

the resource implications of the targets

Professor Philip Barter with Professor Christine Ewan, Dean of the Faculty

and projects in terms of staff, infrastructure and research and development funds;

avenues and principles for sharing resources (including staff) to bring about the planned developments;

ways of designating and funding the Illawarra Area Health Service as a teaching health service (on the same basis as a teaching hospital) of the University of Wollongong.

The Faculty conducted a successful staff recruitment program during 1990 which will enable it to meet its planning objectives in relation to the development of biomedical, bioscience and health policy research.

These complementary initiatives are planned to achieve the overall objective of the Faculty, which is to develop a model for health care based on an effective integrated service extending from primary prevention through tertiary care.

During the year the Faculty installed the latest in high-technology analytical equipment. Stress on a 'subject', visible in the background running on a treadmill, is being monitored by computer and Mr Harry Fuller, who lectures in Human Movement Science

Faculty of Informatics

THE Faculty of Informatics was formed on January 1 from the former Faculty of Mathematical Sciences (Departments of Computer Science and Mathematics) with the addition of the Department of Electrical and Computer Engineering and the Information Technology and Communication Unit.

From the beginning of the year, the Faculty worked under the leadership of Associate Professor Martin Bunder as its Dean, to bring the departments together into a dynamic organisation that will build on the fine record of its predecessor.

The Faculty remains successful in the raising of the quality of intake into the Bachelor of Mathematics and Bachelor of Information Technology courses while increasing overall student numbers. This process will continue with the raising of the HSC cut-off mark for both courses as well as for the Bachelor of Engineering (Electrical and Computer Engineering courses).

As part of its undergraduate recruitment strategy the staff of the Faculty each year visit over 50 high schools, organise a highly popular enrichment program for particularly talented students and an annual presentation to local mathematics teachers and school career advisers.

The Department of Computer Science saw an increase of 20 per cent in its 1990 intake, partly due to its close relationship with BHP Information Technology. A new first-year subject CSCI100, which provides an introduction to students without computing experience, was begun. Together with its associated subjects, CSCI111 and CSCI121, which are spread over the three sessions, this allows for mid-year entry of new students and enables present students, who have difficulty in coping, to catch-up.

A new operating system subject CSCI212 has also been introduced to illustrate the behaviour of various allocation and scheduling algorithms. Following the success of the second-year option introduced in 1989, a third-year database option has been added. The Department expanded its SUN Unix servers and acquired some X-Windows terminals to increase its research into this technology.

The Department welcomed Fergus O'Brien in August as a new Professor and, as from 1 January 1991, Head of Department. He comes with a wealth of industrial experience, punctuated by a period as Associate Head of School at the former New South Wales Institute of Technology, which will strengthen Wollongong's expertise in networking and telecommunications. At the same time, the Department bids farewell to Dr Leczek Maciaszek, who joins Macquarie University as an Associate Professor.

The Department of Electrical and Computer Engineering was the most affected by the creation of the new Faculty but has retained its links with other engineering departments through joint involvement in major initiatives. The Power Research Group has been

Welcome newcomer to the Department of Computer Science is Professor Fergus O'Brien. He came to the University from the computer systems house, Expert Solutions Australia, where he was a director with responsibilities in the communications area covering network design and project management

As part of its undergraduate recruitment strategy, the Faculty conducts an enrichment program for particularly talented high-school pupils. In 1990 the National Australia Bank donated cash prizes for a competition forming part of the program. Seen here with award winners are Associate Professor Martin Bunder, and Mr Paul Lemme, representing the NAB

instrumental in the establishment on campus of an Energy Efficiency Research Centre initially funded with $1.5m from the Electricity Commission of NSW. Its aim is to encourage more efficient use of energy and greater industrial productivity by investigating and developing new technologies, starting in the areas of industrial drives, motors and controls, for commercial use by private enterprise. Another newly-established centre is that of the Switched Network Research Centre headed by Professor Hugh Bradlow. Its work will complement and extend the core research conducted by Telecom Research Laboratories by the exploration of key aspects of intelligent networking and fast packet switching technologies. The Department has had great success in attracting other competitive research grants totalling over $0.9m which, combined with other consultancy work, has enabled new teaching developments, such as first-year student projects and computer-aided-learning techniques, to be introduced.

The Information Technology and Communication Unit has produced a video for distribution to schools and overseas to aid undergraduate recruitment. The Bachelor of Information Technology and Communication course has been extended to include a computer engineering strand and new fourth-year subjects have been introduced, including a six-month industrially-based project with such companies as Kembla Coal & Coke, BHP and ID Tours.

In 1990, the Department of Mathematics hosted a number of overseas visitors. One, Dr Roger Hindley of University College, Swansea, Wales, was funded by the ARC and worked with Associate Professor Martin Bunder on combinatory logic, lambda calculus and type theory; areas highly important to the foundations of mathematics which also have many applications to computer science. Dr Ross Sparks, together with colleagues in the Departments of Management and Mechanical Engineering, worked on the establishing of a Total Quality Management course, available at Master and Graduate Diploma levels and designed to give a comprehensive examination of modern quality concepts and techniques.

For the undergraduate program the Department developed a computer-aided refresher program. Remedial in format, it is aimed at students who did not enter university direct from school or who took a lower-level Mathematics course in their HSC year.

Faculty of Law

Professor Helen Gamble heads the Centre for Courts Policy and Administration. She teaches Law in Society in the first year and Criminal Law and the Process of Justice and Children, Families and the Law in the later years

THE Faculty of Law began operations during the year, taking over the activities of the Department of Legal Studies. Professor John Goldring, a full-time member of the Australian Law Reform Commission and formerly Head of the School of Law at Macquarie University, was appointed as Foundation Dean and Professor of Law. He took up his appointment in June. Two other Professors, David Farrier and Sheila McAllister, were also appointed during the year, together with a number of other new academic staff.

The Faculty prepared to begin teaching courses leading to the Bachelor of Laws (LLB) degree in 1991. The LLB course will be both a general education and a preparation for a range of careers in legal work.

The University has sought the status 'Accredited Law School' for the purpose of having its degrees recognised as the academic foundation for admission to practice as a Barrister or Solicitor of the Supreme Court of NSW.

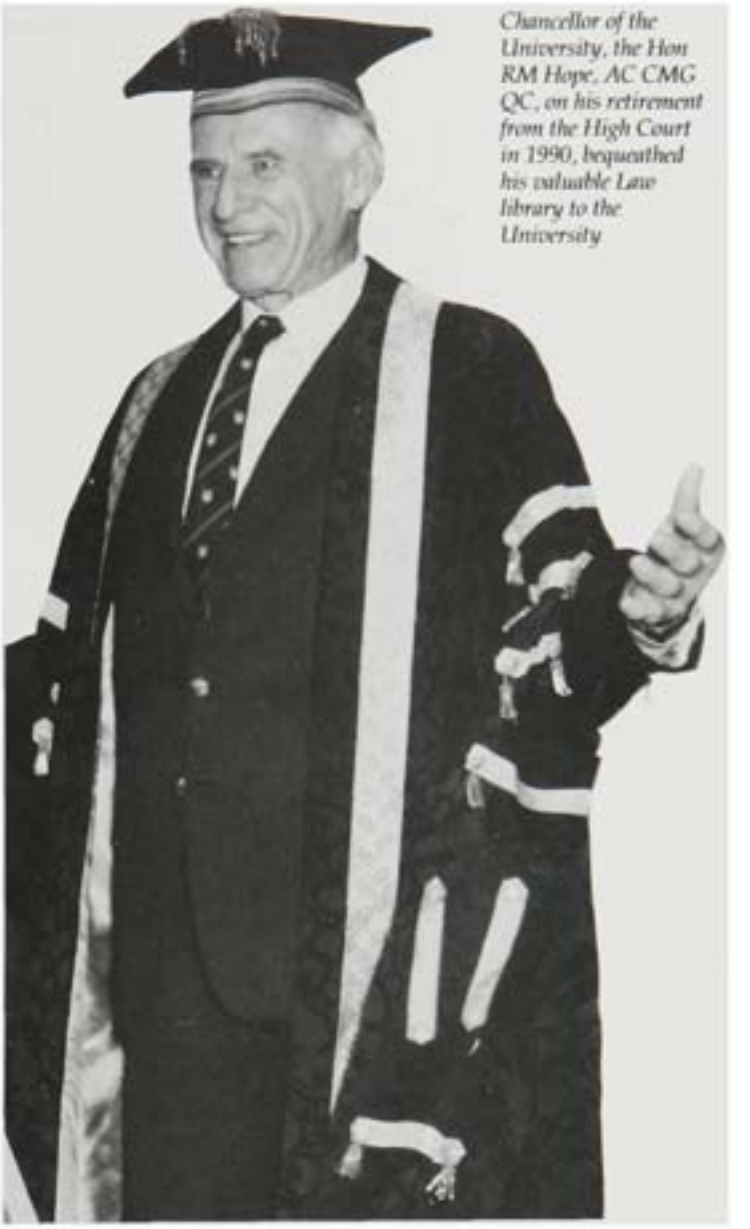
The curriculum for the LLB, which was approved by the University Council, includes subjects which will give students a broad perspective and also an appreciation of the law in action. All LLB students will be required to undertake a period during which they will be able to observe the law in operation at first hand.

Dean of the Faculty of Law is Professor John Goldring. He is seen here (left), at the opening of the University's Sydney Centre in July, with Justice WH Fisher, President of the Industrial Commission of NSW, and Mr Paul Greenwood, President of the NSW Small Business Combined Association

The Faculty has also decided to specialise in two areas of postgraduate teaching and research: Court Policy and Administration and Natural Resources and Mining Law. The courses in Court Policy and Administration designed for court officials and lawyers are well under way and the first students in the postgraduate course will begin their studies in 1991. It is hoped to offer courses in Natural Resources and Mining Law in 1992.

The Faculty will continue to offer general and community education as well as professional education both at undergraduate level and in the form of continuing education for the legal profession. It will also continue to provide education in law for a wide range of undergraduate and postgraduate students within the University. Approximately 240 equivalent full-time student units were enrolled in law subjects during the year, even though teaching in law degree courses had not started. It was expected that this number would increase.

The Law Faculty, through its Visiting Committee and Advisory Committees for its Courts Policy and Administration and Natural Resources and Mining Law, is closely in touch with the legal profession, community legal centres, government lawyers and others interested in legal education. This is important at a time when the organised legal profession and the Law Foundation of NSW are reviving their interest in legal education. Professor Goldring delivered a paper at the first Colloquium on Legal Education in NSW organised by the Law Foundation of NSW in July and he will be delivering three papers at a National Conference on Legal Education to be held early in 1992 under the sponsorship of the Law Council of Australia.



Chancellor of the University, the Hon RM Hope, AC CMG QC, on his retirement from the High Court in 1990, bequeathed his valuable Law library to the University

Professor Goldring and Professor Helen Gamble continue as members of the Australian and NSW Law Reform Commission. Other members of the Faculty are part-time members of the Social Security Appeals Tribunal and members of the Management Board of the Illawarra Community Legal Centre.

Faculty of Science

DURING the year the entire Faculty was involved in a large-scale co-operative effort in the area of science promotion and schools liaison. A highly successful day-long program was organised in July for 200 Talented Year 10 Science students, from 13 high schools in the Sydney south-west region. All five science departments in the Faculty played a role in the program.

During the day, students were shown some of the research work of two departments of their choice and could carry out typical undergraduate experiments. Comments from students were favourable: for example, 'I thought physics was going to be boring but it was fantastic', and '...if the staff enjoy showing school kids this stuff then it must be great being a student here'.

Another schools liaison day was organised in November, this time for Year 11 students from the same group of high schools. In addition, the Departments of Chemistry and Geography arranged whole-day programs for Illawarra high-school students.

To complement these programs, four evening professional-development programs – consisting of colloquia, seminars and the demonstration of equipment and interesting experiments – were organised for Science teachers by the Departments of Biology and Chemistry. The aim of the programs, for both students and teachers, is of course to foster relations between the Faculty and high schools as well as to promote the image of science in the community.

In addition, the Faculty's interactive Science Centre – opened in 1989 – has continued to develop as an important resource for science education in the region, mainly through the work of the Department of Physics.

As a parallel strategy to these schools and community liaison activities, the Faculty is introducing means by which both mature-age and HSC students with inadequate preparation in Mathematics and Science can avoid exclusion from admission to the University's Science courses. The introduction in 1989 of a basic Mathematics subject, to enable students to attain the minimum standard of Mathematics for Science, will be followed in 1991 by the introduction of two new subjects – separate streams in first-year Chemistry and Physics providing remedial tuition for students entering a Science course without an adequate preparation in these subjects. These innovations have gone a long way towards creating a situation in which no student should feel excluded from a Science course.

Towards the end of the year, Bachelor of Environmental Science candidates completed the first year of the new four-year program. A doubling of the numbers of commencing enrolments in the revised degree program indicated the increased interest in environ-

Visitors from the Philippines, Iran, Indonesia and China were among 12 overseas postgraduate students who came to a Faculty of Science workshop on electrochemical instrumentation and sensors. Co-ordinated by Professor Gordon Wallace of Polymer Systems Technology and the Department of Chemistry, the course was aimed at training in electrochemical sensor design, and the design and construction of simple instrumentation

ment-related courses. The Department of Geography experienced a dramatic upsurge in its intake of first-year students – from 150 in 1989 to 250 in 1990 – partly as a result of the environmental science enrolments.

Unrelated to this was a large increase in second-year numbers from 239 to 338, probably as a result of a general increase in interest in Geography as both a natural science and a social science.

A Department of Geology prize night was held in August. Seen here with Associate Professor Tony Wright, the successful students are (left) Jacui Mifsud, Stewart Hankin, Mike Ceccata and Amanda Jones. Kneeling are Gareth Cooper and (clearly a comedian in the making) Rod Feldtmann

Development of the latest technological tools being applied by geographers is progressing in several areas. The Geography Department is now a Reference Centre for remote sensing – one of only three in New South Wales. During the year, for example, the Australian International Development Assistance Bureau funded a special group of remote sensing scientists from the Philippines to visit the Department in order to gain expertise for setting up a remote sensing centre at the University of the Philippines. The Department is one of only two centres for thermoluminescence dating and the only centre that offers a commercial service for this new dating technique that promises to rewrite our understanding of Australian Quarternary history over the past 300,000 years.

A further development in the environmental area was an expansion in teaching and research in Marine Biology. A recent appointment, Dr Andy Davis, contributes marine ecology expertise and complements the existing strengths in marine population biology, physiology, fish immunology and disease. The increased emphasis in marine studies in courses at all levels has been facilitated by the purchase of a new boat and diving equipment as well as the construction of substantial aquarium facilities.

In the 18 months since the installation of the new 16-inch telescope there has been an expansion of the teaching and research programs of the Astronomy and Astrophysics Group of the Department of Physics. While individual staff pursue their own research, they share a common interest in instrumentation, many of the projects depending heavily on image digitising and analysis. An image analysis facility consisting of two video digitising systems has been acquired and software developed which allows the analysis of images obtained from a variety of sources. The systems provide a measurement facility comparable to other more expensive systems now available. These have clear applications for the real time enhancement of images in such applications as medicine and industry, as well as in astronomical research.

The development of this expertise has led to the offering for 1991 of a new postgraduate subject, 'The Physics of Imaging', which will be relevant to students in a number of disciplines.

ACADEMIC AND ALLIED SERVICES

Aboriginal Education Unit

THE introduction during the year of the National Aboriginal Education Policy by the Commonwealth resulted in the development of an Aboriginal Education Strategy. The process leading to the strategy's development, and its adoption, brought about a direction for Aboriginal education that has the support of the University and the Aboriginal education community on the south coast of New South Wales.

The strategy has produced further development of student support mechanisms and an increasing emphasis on research.

A recruiting and liaison relationship was formed with TAFE and the New South Wales Department of School Education in the Illawarra region; and this in turn is leading to the development of a recruitment pipeline between the Aboriginal community, schools, TAFE and the University. TAFE participated in the Alternative Admissions Program during 1990.

Recruitment activities were expanded to incorporate a wider range of Aboriginal organisations, with an emphasis towards attracting mature-age students. This has harvested an increase in the number of Aboriginal people seeking entry to the University through the Alternative Admissions Program. The geographic areas canvassed during the year included the far south and south-coast regions, the Illawarra, western and central Sydney.

Cooperative research and development activities are now being entered into between the Unit, Faculties, Aboriginal communities and TAFE, which should bring about increases in the level and diversity of enrolments and course completion rates by Aboriginal students. Cooperative research is also being directed at linking community needs, recruitment, training and support to professional employment.

Qantas continued sponsorship for Aboriginal students to participate in international conferences; for example, the airline sponsored a second-year Bachelor of Education student to attend the World Council of Indigenous Peoples' Conference in Tromso, Norway (the University and Qantas jointly sponsored a staff member's attendance at the conference).

In order to foster an awareness of Aboriginal culture and education issues on and off campus, the Unit continued to participate in a range of community activities. Included in the list were Heritage Week, National Aboriginal and Islanders Day Observance Committee functions – which incorporated the staging of an Aboriginal Art Exhibition in the Long Gallery – and the production of a promotional video, for use in recruitment activities and for the raising of public awareness of Aboriginal education and cultural issues.

An Advisory Committee was re-established in order to ensure community input from a broad range of Aboriginal and non-Aboriginal people to the Unit's direction.

Participation in courses for 1990 was:

Undergraduate

Bachelor of Arts, 11; Bachelor of Creative Arts, 2; Bachelor of Commerce, 6; Bachelor of Education (Primary), 11; Diploma of Teaching, 1; Bachelor of Education (Physical and Health), 4; Bachelor of Engineering (Civil), 3; Bachelor of Engineering (Mechanical), 4; Bachelor of Applied Science (Human Movement), 2; Diploma of Nursing, 4; Bachelor of Environmental Science, 2; Bachelor of Science, 4; total, 60.

Postgraduate

Graduate Diploma in Educational Studies, 1; Masters (Pass) Education, 1; Masters (Pass) Business Admin, 1; Masters Honours (Arts), 1; Masters Honours (Education), 1; Masters Honours (Science), 1; total, 6.

Qantas provided an airline ticket to enable Fiona Highland, an Aboriginal student at the University, to attend the World Council of Indigenous Peoples Conference in Norway from August 8 to 12. She is seen here with Rick Walford, the Aboriginal rugby league player and a senior education officer in the Aboriginal Education Unit of the State Education Department. He is drawing the winning ticket for a raffle to provide funds for Fiona's accommodation

Centre for Staff Development

THE Centre for Staff Development was created at the beginning of the year to rationalise staff development services previously available from a number of sources within the University.

The year was a planning one during which staff development needs were identified and analysed and administrative procedures devised for the new Centre. A full program of 52 workshops, seminars and other development projects – all rated very highly in relation to relevance and quality of presentation – were conducted, and it soon became apparent that the decision to rationalise services had led to an increased output of work.

One highly encouraging development was a growing number of requests from academic and other units for staff development services. While broad programs open to all members of staff are useful, and in some cases essential, programs which are focused on the needs of particular units or work groups can be more effective – if only because improvement targets can be set and the results of the program evaluated. The growing number of requests from units for focused programs is an indicator of the perceived effectiveness of the Centre and of an increased awareness of the importance of staff development activities.

Submissions to the Commonwealth Government for funds to establish a Centre for Excellence in University Teaching were rewarded with a $100,000 grant for each of the years 1991 and 1992. The grant will be used to deepen and broaden the range of development facilities available for academic staff, but will also have important implications for general staff.

Previous reports have mentioned the Centre's role in the student surveys of teaching programs. During 1990, after considerable work, a user-friendly and efficient system of surveys was developed with a much-improved reporting process. Research into the data now available will begin in 1991.

Equal Employment Opportunity Unit

THE year 1990 was the fifth of operation of the EEO program at the University, and this coincided with the State-wide Equal Employment Opportunity survey conducted every five years by the Office of the Director of Equal Opportunity in Public Employment. The Unit, therefore, experienced a busy and highly rewarding year.

The 1990 EEO survey was conducted to determine progress under the Equal Employment Opportunity program and to provide information about employment patterns and opportunities within the University. Eighty per cent of staff completed the survey, and the University was commended for its high response rate. Results indicate that target group members are increasing their representation at all levels of employment. While this is encouraging and indicates that the University's commitment to EEO is producing results, there is nonetheless still room for improvement.

The Unit was particularly busy during the year, acting in an advisory/consulting capacity. There was a large increase in requests for this type of service from faculties, academic departments, branch heads and centres. While the focus of these requests is EEO-related, they tend to relate more to proactive approaches to human resource management, than to specific equal-opportunity issues.

In terms of staff development, the EEO Unit offered courses on Personal Effectiveness and Creative Conflict Resolution, as well as Selection Techniques. The EEO was also involved in the development of the performance-appraisal system for general staff and conducted training sessions for managers, supervisors, and held open sessions for all staff on 'How to Prepare for Your Annual Evaluation and Development Review'.

The EEO sub-committees continued to function, with the Disability Committee active throughout the year in continuing to raise awareness of the general University community to the needs of the disabled.

The Sexual Harassment sub-committee conducted a number of awareness sessions; and the Vice-Chancellor issued a stern warning to staff concerning professional ethics.

The Academic Women's Co-ordinating Committee met regularly, with a number of issues being examined. The Unit has been involved in the submission of a grant application to the Federal Status of Women agency to address factors influencing women to undertake post-graduate study in Australia generally, and at Wollongong specifically.

Over the year there was an increase in the number of student-related issues. This, coupled with devolution, is gradually changing the face of equity at the University.

Awarded a scholarship to the Centre for Creative Leadership in North Carolina: the University Deputy Librarian Felicity McGregor

Information Technology Services

INFORMATION Technology Services (ITS) group provides the University with support for the academic computing infrastructure, network services, support for users of personal computers, campus electronic mail, Library systems support and with telephone communications services. The organisational restructure of the group was ratified by the Computing Policy Committee in May, to improve the delivery of services to the campus community.

Engineering CAD Laboratory

This group provided consulting, tendering, technical evaluation and installation services for an advanced Computer Aided Design (CAD) laboratory to be used by the University's Engineering departments. Installation of the 22 graphics workstations will provide a state-of-the-art facility for teaching modern technical draughting and design activities and provide a solid numeric computation resource for higher-level engineering calculations. The laboratory was established along ergonomically sound principles and will form the basis for the faculty's accreditation as a regional training centre for one of the industry's best-recognised CAD products.

PABX Installation

The group during this year planned for the installation of a new campus-wide telephone service, including technical and administrative aspects for the delivery of these services to the campus in 1991. The new PABX will be connected to the Telecom network through fibre optic-based ISDN services. Within the University, the PABX will provide a new voice mail service, a range of more user-friendly telephone handsets and better security and billing features.

Network Developments - AARNet

The University's high-speed computer network continued to expand and was connected to several new buildings in 1990. As part of a nation-wide development, the University's backbone network was connected to the AARNet (Australian Academic and Research Network), enabling research staff easy access to world-wide research personnel for electronic mail and information interchange.

Michael Birt Library

ESTABLISHMENT of a Faculty of Law had significant implications for the Library. Although a small collection existed to support legal studies, the introduction of professional law courses necessitated the acquisition of a large amount of material. In addition to a foundation grant from the University, the Library received donations from several organisations. The largest quantity of donated materials was received from the Chancellor, the Hon R M Hope, AC CMG QC.

Automation of Library activities continued with the implementation of serials software. This made it possible to identify on-line the latest issues of serials received in the Library. Work began on the addition of historical data about the serials collection.

Other automation developments included the extension of local area networks within the Library building. This increased the productivity of Library staff and permitted access to the Australian Academic Research Network and to a range of bibliographic and textual databases.

Equipment for the networking of databases on compact disks was installed late in the year. Although the use of the equipment was affected by software license restrictions, the Library was one of the first Australian academic libraries to network CD-ROMS successfully.

Strategic planning continued to be a normal part of the Library's management activities. Toward the end of the year, senior librarians embarked on a process of envisaging future library services, a long-term process aimed at exploring the possible nature of the Library in ten years and formulating strategies which will enable its realisation. With a solid staffing foundation and technology infrastructure created over the past few years, the Library is poised to take advantage of developments toward the increased provision of information services in electronic formats.

ALUMNI ASSOCIATION

EXPANSION of the University in recent years to an institution with a reputation that is highly regarded both nationally and internationally has emphasised the need for greater interaction with our graduates and other former students and staff. Our alumni have the potential to be the University's best ambassadors in the community and they have much to gain themselves by keeping in touch.

In acknowledgment of the importance of the University's former associates an Alumni Office was established in May 1990, located in the Administration's Planning and Marketing Branch. The unit is managed by one staff member, the Alumni Officer. The main objective is to develop mutually beneficial relations between the University and its alumni, and in the first few months the following has been achieved:

- Programming of the alumni database, which is on the University's central computer system, has begun. This will contain information on all alumni to enable specific and overall mailing lists to be produced as well as statistical data.
- A new publication for the alumni, *Wollongong Outlook*, replaced the former *Gazette* and is sent twice a year to all graduates for whom a current address is held. This magazine aims to keep alumni informed about developments at the University and also contains articles about graduates, their achievements and interests.
- Contact with specific groups of alumni outside the Illawarra began with cocktail receptions held in Wagga Wagga, Canberra and Kuala Lumpur, Malaysia, during the second half of 1990. Each of these was successful in attracting significant numbers of alumni and some regional sub-groups of alumni are to be formed as a result.
- A video outlining recent developments at the University was produced for use at alumni functions, especially those held away from the Wollongong area.

Since its inception the Alumni Office has worked closely with the Graduates Group within the Friends of the University. The Alumni Officer assisted the Group in some of its activities during 1990, such as the highly successful Book Fair on Open Day and the Graduation Dinner in October.

No fewer than eight Wollongong alumni, from a staff of 18, are today in jobs with an exciting future at Telecom's Customised Software Solutions Centre in the Illawarra Technology Centre on campus. Seen here are four of the eight at work: from left they are Ericka Lovell, Dan Cunningham, Andrew Zahra and Richard Scott

STUDENT SERVICES

Accommodation

Halls of Residence

THE University provides accommodation for 840 students in five residential facilities. Two – International House and Weerona College – are collegiate, each servicing 200 students. The three non-collegiate residences provide the remaining 440 places. Private accommodation is found in the Wollongong area for students who prefer it. The off-campus system handles annually between 800 and 1000 offers of housing.

Collegiate

International House

The year saw International House and Weerona become separate administrative entities, with the appointment of Philip Dutton as full-time Head of Weerona. The presence of three accommodation professionals at the University has allowed for the development of a much-needed peer-support system for the Heads, and has resulted in the further refinement of different styles of accommodation as well as greater co-ordination of accommodation services between the various collegiate and non-collegiate systems.

International House has in the past suffered from site difficulties, since it is surrounded by freeway, railway and creek, and with very little available land for further development. These limitations have been addressed by landscape architects, with a proposal which includes additional parking; landscaping the approach to the House, including planting unsightly embankments; and the provision of much needed volleyball and multi-purpose courts. It was proposed that these amenities be provided one at a time, with the construction of the volleyball court being undertaken in time for the start of the 1991 academic year.

The House continued its tradition of inviting Faculty and University staff as guests and speakers to faculty dinners and commencement and valedictory dinners, adding for the first time in 1991

Weerona, the University's second collegiate hall of residence, was formally declared open by the Chancellor, the Hon RM Hope AC CMG QC, in October. With the Chancellor, seen here on the right, are US exchange student Laura Hughes, head of college Philip Dutton, and a student member of the Weerona Management Committee, Karen Willis. Weerona is now fully operational, with accommodation for 200 students

an international dinner with cultural show and exhibition.

Academically, International House graduated its first University medallist, Colin Goodger, at ceremonies in April, and his achievements in Civil Engineering were recognised formally at the House at the annual commencement dinner.

Residents continued to be challenged to take responsibility for their affairs, with the formation of a food committee to advise on food-related matters and a house committee, which took responsibility for the drafting of a policy on alcohol use. Residents now have a choice of four evening meal selections (including vegetarian). The draft alcohol policy was adopted and forms part of the code of conduct for 1991.

Fees continued to be at the lowest end of the University-catered accommodation range: $110 a week for full room and board. Of the total 200 residents, 66 per cent were Australian, 10 per cent were postgraduates, 40 per cent were female, and 48 per cent were first-year students.

Weerona College

The University opened its second fully collegiate hall of residence to 200 students in February, following the completion of two new residential blocks at the end of 1989.

The College operated as an independently managed unit of the University for the first time in 1990 and appointed as its first Head of College, Mr Philip Dutton, formerly Dean of Students at University of Western Sydney, Hawkesbury.

The College had an excellent year of establishment and activity in catering for its fully international profile. Its residents were from 22 nations, including Australia and New Zealand.

In support of its mission for students the College played host to visiting groups during the summer, including the Australian Swimming Squad, as well as delegates to conferences and workshops at the University.

The College was officially opened by the Chancellor, The Hon R M Hope AC CMG QC, at a special ceremony on October 19.

Non-Collegiate

Campus East: The facilities at Campus East were enlarged during 1990 by the addition of 100 places. They now accommodate 188 single students and 11 families. The central dining room provides 19 meals a week for each single student. The single/individual occupation fee for 1990 was $110 a week.

Kooloobong was enlarged in 1990 to accommodate a total of 200 senior students in townhouse-type dwellings on the main campus. The residents, in groups of five, are responsible for their own cleaning and catering. The single/individual occupation fee was $76 a week.

Gundi accommodates 39 students in townhouse-style units, in groups of seven students, who are responsible for their own cooking and cleaning. The complex is centrally located, near the beach and the town. The single/individual fee for 1990 was $74 a week.

Careers and Appointments Service

CHIEF aim of the Careers and Appointments Service is to support the education role of the University. This role is conducted through the provision of services to graduates, to help them make informed career decisions.

The service has now been operating for three years. During that period the structure of an effective careers service has been established and programs have continued to be developed.

Programs consist of campus visits from employers of graduates to conduct recruiting interviews, work preparation workshops, group and individual careers advising, maintenance of a resource library and the dissemination of information about the graduate careers market.

The Careers and Appointments Service office is staffed by one Careers and Appointments Officer, one secretary and occasional casual staff during critically busy periods.

The number of employers visiting campus has increased each year. Many students continue to be well placed in government departments and private companies.

The annual conference of the National Association of Graduate Careers Advisers (NAGCA) was held at the University in December. It was convened by the Careers and Appointments Officer.

This conference brings together careers advisers from all over the country and recruiting personnel and managers from graduate-employing companies and government departments. It provided the opportunity for some first visits to the University for employers and careers advisers from other institutions.

Counselling Service

THE Counselling Service promotes student development through a range of programs which provide education for living as well as facilitating students' academic progress. When students begin their university education they are provided with transition to university workshops which aim to prevent failure and attrition during their first sessions.

These workshops establish for new students a mentoring system, provided by successful senior students. New students may seek support and guidance from the senior students during their first year. During 1990, 740 students participated in this program.

A similar program is organised for international students. It deals with cross-cultural adjustment as well as the questions of adapting to university learning; 260 students made use of this facility.

As students progress through their courses they are provided with a range of programs catering to their special needs. Assertiveness training, self-confidence building and stress-management programs are provided during each session. Networks are organised for such disadvantaged students as women in non-traditional areas, mature-age students and those with disabilities.

Student development also takes place through individual counselling. In this program, students consult counsellors about the wide range of personal problems associated with being at university, or difficulties in their personal lives. During 1990, 1,262 people sought counselling in a total of 3,073 interviews. This represents a 33 per cent increase in the number of people requesting counselling and a 54 per cent increase in the number of interviews. This increase stemmed largely from new services provided for international students (specialist counselling service was provided for those experiencing adjustment difficulties). The number of students making use of this service during the year was 127, for a total of 276 interviews.

An Overseas Student Adviser provided assistance to international students with welfare problems and 484 students made use of this service for a total of 1,135 interviews.

Recreation and Sports Association

THE year was one of excitement for the Recreation and Sports Association. The major development of the swimming pool was finished after being held up for almost 12 months by wet weather. On the negative side, the costs increased dramatically and the RSA had to contribute far more to the project than originally envisaged. Fortunately the level of activity in the Recreation Centre skyrocketed, with all programs filling quickly and casual use of every facility showing strong demand. The added attraction of the pool may have helped.

During the year the outside community also made much more use of the facilities. The Aquatic Centre showed 50 per cent community use; and this is expected to increase over time. There is little doubt that if it were not for on-campus parking charges, the community use of facilities would approach the astronomical.

The Aquatic Centre, which features Wollongong's first 50-metre heated swimming pool, was opened on July 20. In the foreground on opening day is Mrs Pat Rees, a former lecturer in physical education who has been on committees since 1950 attempting to establish such a pool and is honoured with lifetime membership of the Centre. The project was funded by the University ($600,000), a loan from the National Australia Bank ($150,000) and funds from the Recreation and Sports Association

Club district sport and performance at Australian Universities Championships was very good, with top efforts in soccer, rugby league and union, netball, golf and cricket. Promotion of club sport has been greatly enhanced by the employment of a club officer. The severe weather-related restrictions on weekend sport, especially hockey, led to renewed calls for an artificial playing surface on campus. It is hoped to complete this project by April 1991.

All in all, it was a year of financial tension, as the project costs on the pool demanded that adjustments be made and that all other facilities operate at their maximum. The Association must continue to work for very high levels of facility use and continued facility development in 1991, which will include the artificial hockey surface. An artificial running track and relocation of the tennis courts will consolidate what it is felt will be the most efficient, attractive and practical recreation facility development at any university in Australia.

As recorded in 'The Year in Review', elsewhere in this report, the Wallabies trained on the University oval for their test match against the French

Students' Association

THE Students' Association comprises all students enrolled at the University. Its governing body is the Students' Representative Council (SRC). The Association's objects – encapsulated in its Constitution – are:

a) to afford a recognised means of communication between its members, the University Council and other bodies within the University;

b) to represent its members in all matters affecting their common interests; and

c) to promote the social and intellectual life of its members.

The Association provides a variety of services to its members, including free advice on academic regulations, AUSTUDY, taxation, legal and other student-related matters.

Clubs and societies form a vital part of the services offered by the Students' Association. The SRC has over 20 affiliated clubs and societies representing special interest clubs, ethnic groups and faculty societies. The SRC insists that student membership of any club or society is open to every student enrolled at the University.

The Association funds its own free, monthly newspaper/magazine *Tertangala* (Aboriginal for smoke signal). The SRC Media Production Unit also deals with the collation, editing, design and layout of the paper, which is provided for the benefit of students.

Much of SRC office-bearers' time is devoted to advocacy and representation to University administration and academics, plus ensuring that students are able to obtain and maintain Federal Government benefits such as AUSTUDY. Except for the president and the editor of *Tertangala*, all members of the SRC give their time on a voluntary basis. Many have made considerable sacrifices to help members in difficulty and to promote the interests of the Association. The Students' Association is a democratic institution.

In order to meet the ever-increasing demand on SRC services by students, the SRC has employed an administrative secretary in a full-time position.

The SRC planned to expand its services to take into account increasing membership as a result of the Unified National System and the enrolment objectives of the University. The Association and the SRC are totally committed to meeting the aims and objectives under the Association's Constitution.

Student Learning Assistance Centre

THE year was the second of the University of Wollongong innovation – the Learning Assistance Centre. Catering for students from first year to PhD level, the Centre saw in Semester I an average of 21 students arrive each day for help.

Another regular activity to supplement the ongoing and varied support in study skills, writing, thesis preparation and exam technique, is a weekly oral communication workshop for international students.

Further contributions were also made to the Mature Age Orientation Program and International Orientation.

'Special' programs were also mounted. The Centre continued to conduct the successful DEET-funded Gateway program. The first graduates of Gateway, after one semester at the University, showed the value of the program: 96 per cent of the studies taken reached a Terminating Pass or better, while 67 per cent achieved Credit status or better.

During the year, 62 people were enrolled in the second Gateway intake and at the completion of the program 45 were seen as achieving an academic level to allow enrolment into the University in 1991. The Centre also conducted a supplementary support program for international students. Nineteen of the 20 attending received a Terminating Pass or better, while 11 achieved Credit status or better. Three were at Distinction level and three received High Distinction.

The Centre was fortunate to have employed Pat Murray and Royce Levi, both of whom are prepared to 'go that extra mile' in their dedicated efforts to help the students learn more effectively.

University Union

THE University Union in 1990 further developed its role as the community centre of the University, providing a haven for students and staff to engage in social and cultural activities away from the formal academic life of the institution.

Highlights of the year included:

a) The redesign and restructuring of the food-service operation of the Union, which resulted in a dramatic increase in turnover and customer usage, a better range of foods, faster service and a better net financial result.

b) The large number and variety of cultural and social activities provided for the enjoyment and/or further education of the membership. Faculty lunches and barbecues, musical concerts of virtually every kind, club and society support, regular film nights, art exhibitions, street theatre, and revues, 'arts to dinner' evenings, quiz competitions, Multicultural Week, Aboriginal and Torres Strait Islander Week, Blue Stocking Week and other theme weeks; and a host of alternative activities provided opportunities for social and cultural interaction, particularly for the increasing number of international students.

c) The start of Stage 6 of the Union. Costing $4.4 million, this project will provide 1000m^2 of ground floor for an expansion of the retailing activities. On level 2 the development will provide a large conference and function centre, while level 3 will be available for academic and administrative purposes. Stage 6 will be constructed without State or Federal Government support, with the Union providing $3.6 million from reserves and borrowings, and the balance of $800,000 being provided by the University.

The University Union continued to provide childcare for the campus community, administering the 80 places available through the childcare centre.

Conference, seminar and meeting rooms were provided free of charge to University groups. Union facilities were also used for examinations, orientation, graduation and other official University purposes.

Union Arcade services, including pharmacy, medical, dental and optometrical services, hairdresser, travel agent, mini market, bank and credit union provide valuable services to staff and students of the University.

The Union is part of the University Open Day Committee and plays an important role on 'the Day', traditionally held in August. The Union Hall is the venue for such classical entertainment as this Chopin recital for six hands. (And of course its catering unit provides excellent food for visitors)

Research

Stages 1 and 2 of the Illawarra Technology Centre. Stage 3 is due for completion in 1991

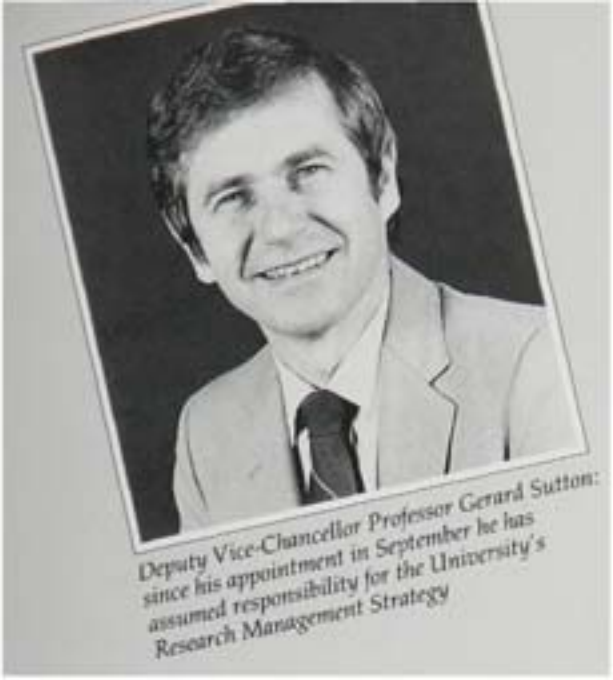
THE STRATEGY IS WORKING WELL

All the major research work in progress and some notable advances already achieved are fully described in the University's RESEARCH REPORT – 1989-90. Here we present a summary of the year's achievements and some examples of research programs in hand or recently completed.

THE University's Research Management Strategy promotes interdisciplinary research, involving academic staff and postgraduate students, with interaction and support from relevant community elements. Now in its second stage, the Strategy has facilitated the formation of more than 30 research programs, each involving at least six academic staff from campus-based Departments, Schools and Centres, in addition to many smaller-scale research projects by individuals and small teams.

Another important development has been the decision to establish a $75m Business and Technology Complex on the University's Campus East site, to complement and expand the research and development work of the Illawarra Technology Centre on the main campus. Designed to offer an environment for research and development by private enterprise, the complex will include a conference centre and hotel. Completion, in partnership with industry and developers, will enable the University to capitalise on continually emerging opportunities through specific commercial ventures to make an even greater contribution to the national economy.

Links with industry are strong and progressive. Telecom Australia in March 1990 established its own high-level research and development laboratory on campus and Northern Telecom of Canada has sponsored a facility here to develop high-tech products for international markets, pledging some $37m for R&D over the next seven years. Canon Inc, the Japanese office equipment and camera manufacturer, has signed a contract with the Centre for Information Technology Research (CITR) to conduct R&D over a three-year period under an agreement worth $3.5 million. The University's applied research centres have rapidly expanded in response to industrial and community demand. They now include: Biological and Chemical Analytical Services; Advanced Manufacturing and Industrial Applications; Bulk Materials Handling; Applied Biology Research;



Deputy Vice-Chancellor Professor Gerard Sutton: since his appointment in September he has assumed responsibility for the University's Research Management Strategy

Mining Research; Multicultural Studies; Studies in Literacy; Mines; and New Literatures Research.

The University's fast-growing commercial research arm, the Illawarra Technology Corporation (ITC), has been restructured as an umbrella company, taking over the work previously performed by Uniadvice, the University's industry-linked Research and Development facility (now wound up), together with responsibility for many of the University's 17 applied research centres and testing facilities. Research centres now operating under the aegis of ITC are: Automation and Engineering Applications; Automation Extension Services; Information Technology and Research; Transport Policy Analysis; Microwave Applications; Work and Labour Market Studies; and Technology and Social Change. Other research-linked facilities include: ITC Testing Facility (Biological and Chemical Analytical Services), Foundation Studies, and Polymer Systems Technology.

The Illawarra Technology Centre, referred to above, was established in 1983. Stage I was completed in 1984 and Stage II in February 1990. In response to demand, building work on Stage III began without delay and completion is expected early in 1991.

Some research programs of outstanding general interest have been selected for brief description here. They are grouped under their salient links – Industry, Environment and Community – but in many instances they have potential for application in wider areas. Most of them, following the University's Research Management Strategy, have been designed to optimise use of staff and facilities from several departments or disciplines.

Monica Bufill with her testamur after graduating as the first woman at the University to gain a doctorate in Civil and Mining Engineering

A major area of University research is in the area of transport policy analysis. TPA's work is under the direction of Associate Professor Ross Robinson, whose long-term projects have focused on maritime policy, port pricing for Australia's rural exports and domestic freight flows

Advanced Manufacturing Technology

Flexible and versatile – new ways of making things

The Advanced Manufacturing Technology (AMT) Research Program is effectively the 'research arm' of CAMIA, the Centre for Advanced Manufacturing and Industrial Automation. Thirteen academic and five associate members, mainly from the Department of Mechanical Engineering and CAMIA, contribute directly to the program, together with 11 postgraduate and 20 final-year undergraduate thesis students. Members of the research group hosted this year's fifth IEAust International Conference on Manufacturing Engineering, ICME-90, in July, soon after Phase I of the computer-integrated 'ACME' Flexible Manufacturing System (FMS) had become operational as a major Australian research and demonstration facility.

The AMT Research Program is broadly divided into five streams:

- Advanced manufacturing processes, machine tools and tooling
- Intelligent manufacturing systems
- Quality monitoring systems and technologies
- Computer-Aided Design (CAD)/Computer-Aided Manufacture (CAM)
- Integrated manufacturing planning and control systems.

A few improvements recently achieved by the group indicate the wide range of interests involved:

- Machinability of 'high-strength, low-alloy' (HSLA) steels used extensively in ships, pressure vessels, pipelines (oil and gas) and off-shore platforms, and especially in the transport industry.
- Efficiency of robotic assembly in handling components with peculiar geometric configurations
- Vision system capabilities, to achieve 3-D image recognition, using an autofocus lens attached to a vision system
- Bonding of plastics and composites without adhesives, using microwave energy
- Automatic ultrasonic inspection using a robotic immersion scanner and data acquisition algorithms.

The ACME flexible manufacturing system in 1990 became one of the major research tools and an important demonstration facility

Engineering and Industrial Mathematics

Cavitation, underwater explosions and vortex sheets

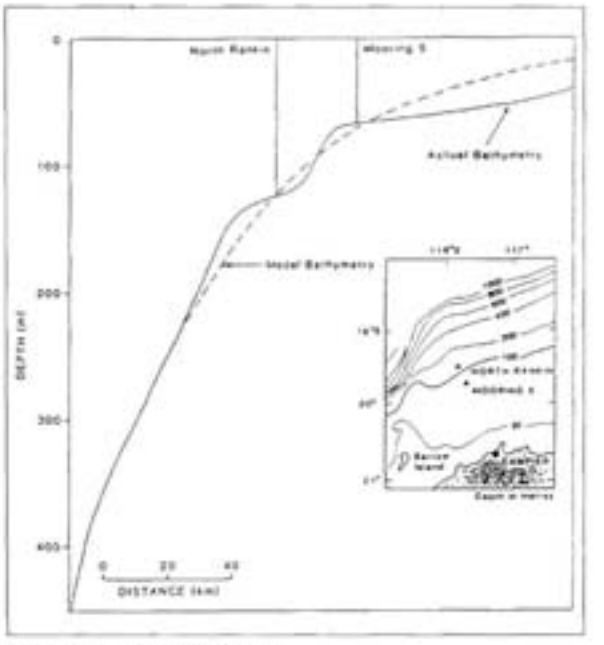
In recent years, as computing capacity has increased, the number of students following science, engineering and mathematics has decreased. This means that modern computing power is not fully exploited for the benefit of industry. This program combines applied mathematics and computing in accurately modelling sophisticated engineering and industrial processes.

Among processes being examined are the flow behaviour of mould powder in the continuous caster used in the production of steel; stresses and deformations arising at the point of contact between solid bodies with surface layers with differing elastic properties; cavitation, underwater explosions and vortex sheets.

The phenomenon of cavitation is well known: tiny vapour bubbles form in hydraulic machinery or pipes, generating undesirable vibrations and noises and eventually causing premature failure. The physics of the problem is complex but experimentation has proved possible using a camera capable of recording up to 20,000 half-frames a second to capture a sequence of images of bubble distortion for analysis.

Underwater explosions, too, require experiment as well as theory for full understanding. There are two principal damage-causing mechanisms: the shock wave and the creation of a large bubble containing the gaseous remains of the detonation. Thus two parallel research projects have been needed. Studies in shock dynamics involve complex mathematical formalisations to develop a computer model to determine the motion of the shock wave as it propagates around various geometric target shapes. Investigation of the motion of oscillating bubbles has revealed many curious behaviour patterns, including the phenomenon of bubble rebound, where the compression of the nebulous bubble contents on collapse forces the bubble to re-expand. Preliminary work has demonstrated the feasibility of scale-model study of the behaviour of an exploding bubble and work is under way to fulfil a contract from the Underwater Weapon and Countermeasure Systems Division, DSTO, to build a decompression chamber over one cubic metre in volume, for use in this study.

Studies have also been carried out on vortex sheet techniques for flow separation, for example around sharp edges such as wings and bilge keels.



Shape of the North-west Shelf

Other work now being undertaken involves ocean currents on the North-west Shelf of Australia and the eruption of volcanoes. Some oil and gas drilling platforms on the continental shelf edge experience more prevalent structural damage than other drilling platforms, perhaps because large amplitude waves are generated by tides there, and decay rapidly towards shore. Generation of these waves is being studied by analytic and numerical methods.

The process of volcanic eruption has been made clear through mathematical modelling: the flow of magma in the Earth's mantle leads to the formation of local regions of high magma concentration. These regions rise to the Earth's surface and cause volcanic eruptions.

Applied Statistics

Beach erosion: long-term predictions

Current activities of this research program involve the collection, storage and interpretation of information in fields as diverse as engineering, education, economics and epidemiology. In each case, relevant mathematical theory is developed and applied to a particular problem. Prediction of beach erosion, for example, has been facilitated by ongoing research.

Ten years ago, long-term beach erosion studies were mainly confined to an analysis of the annual winter-summer cycle as related to the annual

wave regime. More recent studies at Warilla beach, NSW, have shown that the interannual variability is dominated by a quasi-biennial oscillation, previously unknown, followed by a three-year to three-and-a half-year oscillation identifiable with the meteorological Southern Oscillation (the name given to the mean monthly sea-level-pressure differences between Tahiti and Darwin).

Examination of daily synoptic weather charts for Australia spanning 26 years has established that the weather system intensities also fluctuate with a quasi-biennial oscillation that was formerly unknown. These have been linked with erosion on Warilla beach, with a correlation coefficient of 0.49. As a result of this and associated statistical analysis, a number of improvements have been made to predictive performance.

Through the Statistical Consulting Service set up last year, the program's activities have been extended to the whole University research community, as well as to clients in industry, commerce and the public sector.

A technician at work in the AEAC laboratory. AEAC pioneered robotics in Australia. In 1990 it scored a world's first with automation for Qantas' in-flight catering service

Advanced Engineering Systems

World first in robotic flight-catering

A highlight and widely acclaimed AEAC (Automation and Engineering Applications Centre Ltd) achievement of the year was the design and commissioning of a major automation system for Qantas, to load nine items automatically on economy-class trays. The system involves nine interacting computer-controlled machines, linked by a conveyor. The computers are networked to a console which permits an operator to monitor the status and performance of every module.

At an informal ceremony held at Qantas on May 29, robotics pioneer Professor Chris Cook, 'founding father' of the centre, accepted on behalf of AEAC a cheque for $150,000, the final progress payment for the work.

All the mechanical, electrical and computer design and much of the manufacturing for the system were carried out by AEAC engineers. The first of its kind anywhere in the world, the system was built in Wollongong largely by University graduates.

Qantas staff were put through a comprehensive training program before the system was installed. Much of this training was carried out by the Australian Training School for Advanced Manufacturing, another Wollongong University company.

Although AEAC has a broad client base in Australia in the food and pharmaceutical industries, focus is now turning to international markets, especially in the airline catering industry and the beef industry, in both of which Australian technology leads the world.

Much interest has already been shown in the tray loading system by overseas airlines. Qantas and AEAC are jointly marketing the system both within Australia and internationally.

Qantas is to be congratulated on its perseverance in supporting the project for two years, during which many technical obstacles, which at times seemed insurmountable, were successfully overcome. The outcome triumphantly demonstrates once again that it is not necessary to go overseas for innovative technology, in which Australia is well equipped to lead the way through interdisciplinary research and development projects of this kind.

Advanced Materials and Surface Engineering

Materials that remember their shape

Research and development of advanced materials has been a significant activity of members of the Department of Materials Engineering for over ten years. Early research on shape memory alloys and glassy metals has been complemented more recently by investigations in the fields of ceramics, polymers and composites, particularly composites

produced by surface engineering processes such as ceramic coating of metals and zinc alloy galvanising of steel. These activities have been co-ordinated under the Advanced Materials and Surface Engineering Program, with the common purpose of materials development and evaluation of structure-property performance relationships.

'Shape memory behaviour' describes some unusual mechanical properties exhibited by certain classes of alloys. The outstanding property is the ability to recover from very large strains. If the strain is recovered immediately on stress removal, the effect is known as superelasticity; if moderate heating is required to activate the recovery, the phenomenon is called shape memory effect (SME). Commercial applications are many. By far the best alloys so far developed are the Nitinol group, based on about 50 atomic per cent each of nickel and titanium, but these are expensive to produce in appropriate forms and less costly alternatives such as copper- and iron-based alloys are being sought, through fundamental studies of crystallographic relationships, with the aim of elucidating the mechanism of shape memory behaviour and thereby establishing principles for optimising alloy composition and processing treatments. Additional work involves application of the melt spinning, rapid solidification technique also evolved by the program to the production of shape memory alloys in the form of thin strip.

All these projects are based on the development and evaluation of the structures and properties of the materials being investigated and are interesting and significant both from a fundamental viewpoint and in their potential of commercial exploitation.

Dr Arnold McLean displays a granular shear cell, one of the tools used in his research into the flow of bulk materials in pipelines

Bulk Materials Handling and Physical Processing

Higher speeds in the pipeline

Bulk solids represent a vast range of 'everyday' materials, ranging from raw materials in the mining industry, for example iron ore, coal, gold ore, and agricultural products such as grains, meals and beans, to delicate products of the food industry such as granulated coffee, milk powder, soft-drink flavouring and flour and pharmaceutical powders, such as paracetamol. These materials need to be stored, handled and transported, often by pneumatic conveying through pipelines.

What happens to the bulk solids in the pipelines is of major concern to designers and users and depends strongly on the properties of the material, the conveying rate, transport velocity and pipeline configuration. New hardware and design techniques are needed to increase reliability of operation with new materials and in more demanding applications, but unfortunately much controversy still exists in certain design areas and much relevant information is based on overseas experience .

The pneumatic conveying project associated with this research program is aimed at investigating all controversial design aspects and providing industry with the information needed for designing, selecting and trouble-shooting conveying systems. It is supported by $500,000 funding.

One concentrated activity researched in the last 12 months has been the development of a greater understanding of the variation of coal stockpile densities, information of vital importance to the Australian black coal industry for prediction of ship and stockpile capacity and confirmation of ship surveyed tonneages, and also for prediction of stockpile content at power stations.

Research also continued into measurement and prediction of powder properties, one application of which has been the development of a low-cost method of granulating fine coal, successfully producing a stable high-quality granulated product from local coal-preparation plant waste refuse slurry. The developed progress generates many benefits and also has potential to use waste residential oil and paper. It is expected to gain wide-spread acceptance in the local coal industry.

Advanced Telecommunications

Tomorrow's telecommunications will change our lives

The Advanced Telecommunications Research Group combines the skills and talents of academics from the Departments of Electrical & Computer Engineering, Computer Sciences, Mathematics and the Centre for Information Technology Research. The Group's research is focused on technology that will enable tomorrow's telecommunication systems to be effective in both cost and efficiency.

The way we work and live could soon be revolutionised by services like video telephony and conferencing and intelligent networks. The technology that will enable these services to become reality is the fast packet switched network. The research group is actively working on problems associated with these services and technology in close co-operation with industry.

During the past 12 months research effort has been concentrated on three areas:

- fast packet switched networks and integrated services digital networks
- digital signal processing, with particular emphasis on speech, image and video coding techniques, and
- telecommunication policies and organisational problems.

Tribology: Friction Lubrication and Wear

High-speed bearings that don't fail

An experimental thrust bearing test rig has been successfully commissioned to test different types of thrust bearings at speeds up to 150 metres/sec. The rig is fully instrumented to measure oil film thickness, pressure, friction, temperature and fluid velocity. The data are captured by a high-speed data-logging system and the fluid velocities are obtained by a Laser Doppler anemometer using optical fibre and miniature optics. The experiments are being carried out on bearings operated in the superlaminar regime and the results are correlated with a computer simulation. It was found that the existing design theories on turbulent bearings are inaccurate and a new theory for high-speed bearings has been proposed. This project has been funded by an ARC grant of $106,000.

A computer simulation has been carried out to determine the vibration characteristics and stability of steam-turbine bearings in power stations. This simulation indicates a need to correlate with experimental results. A half size bearing is to be tested in a fully-instrumented journal-bearing test rig built and commissioned by the Department of Mechanical Engineering. This project is supported by Elcom, NSW, and the Australian Electricity Supply Industry Research Board with a grant of $76,500.

A co-operative research project is being carried out with BHP Steel on friction and wear in heavy industry. A universal friction and wear test rig was built and tested and can be used to simulate realistically adhesive and abrasive wear in an industrial environment. The project is supported by BHP Steel, SPPD (Port Kembla) by a grant of $26,100.

Structural Engineering

Safety, strength and social integration

Significant progress was made during the year in the field of structural engineering within the Department of Civil and Mining Engineering. Projects included the inelastic behaviour of tubular steel struts, prediction of static and dynamic wall pressures on silos and hoppers, shear lag and transverse stresses in thin-walled beams, an introduction to self-erection of space trusses by post-tensioning and the influence of surface frictional characteristics on the behaviour of friction-grip joints.

In the field of transport engineering, an urban centre parking model has been initiated which involves procedures for modelling parking and route choice within urban centres. The model will predict the effects of parking location, sizing and management policies and will facilitate determination of the impact of new land-use developments and traffic management schemes.

Dynamic investigation of footbridges was selected as a thesis topic for a Bachelor of Engineering degree after discussion with Roads and Traffic Authority as potentially beneficial both to the University and the Authority. Three footbridges were selected for study. The first aim of the thesis is to produce design procedure with a dynamic analysis which can reliably predict the natural frequencies of a footbridge, thus avoiding a situation where a single jogger could excite a bridge of a mass of about 15 tonnes. The second aim is to propose some modification to existing structures to improve the serviceability performance.

Fossil Fuels

Mapping and planning our fossil fuel reserves

Members of the Fossil Fuels Program see Australia's energy requirements being maintained at a relatively high level well into the next century, with both coal and petroleum continuing to be essential for Australia's immediate and long-term energy requirements. Closely allied to this will be the maintenance of steaming and coking coal exports, since the Australian economy relies heavily on these to overcome balance of payments problems. A significant increase in oil prices or a change in government policy could see a shift towards alternative sources of liquid hydrocarbons, in which case oil shale may again be in prospect. As a leader in fossil fuels research, the Fossil Fuels Program has evolved a diverse research program encompassing coal and petroleum geology, organic petrography, hydrocarbon generation, geochemistry and sedimentology of oil shales, ground control and mine safety, coke, resource assessment and quality control. A welcome addition this year is a new Leitz MPV microscope with photometer. Photometer data are directly input to a computer with programs that allow reflectance and fluorescence spectral data to be output via graphics or tabulated copy.

The major area of research in sedimentology and stratigraphy of coal sequences for the past three years has been a revision of the geology, stratigraphy and coal resources of the southern Sydney basin, a study funded by the National Energy Research Development Program. This study has been completed and the final report submitted. The recommended revisions to the stratigraphy of the southern Sydney Basin not only provide a more workable system but also will allow meaningful correlations with the Western Coalfield.

Bioactive Molecules

Potent new drugs from rainforest and reef

Many chemicals and biochemicals have marked physiological activity which may be either beneficial, as with drugs and normal body function, or detrimental, as with environmental toxins. Understanding the behaviour of such molecules and the factors controlling their biological reactivity is thus of fundamental importance and has major implications in areas ranging from the pharmaceutical industry to environmental impact studies.

A PhD student at work in the Department of Biology

The Bioactive Molecules Research Program brings together overlapping research interests in the Departments of Chemistry and Biology involving the synthesis, characterisation and testing of such pharmacologically and physiologically active molecules, enabling a most comprehensive range of techniques and skills to be brought to bear on specific problems. For example, cell culture techniques from Biology have extended the scope of projects initially based in Chemistry involving the biosynthesis of pharmaceuticals.

Natural products from tropical forest plants are recognised as a major potential source of potent new drugs. Several bioactive alkaloids from rainforest species have been isolated and structurally characterised and are now being tested for anti-microbial behaviour.

Marine flora and fauna are another important and largely untapped source of new and unusual bioactive molecules, including some with potential as anti-tumour and anti-AIDS agents. Considerable progress has been made in isolating and elucidating the structures of novel metabolites from various marine pulmonates and sponges from the Illawarra region and the Great Barrier Reef. The significance of this work has been internationally recognised.

Two major projects are investigating improved methods for the identification and quantitative determination of volatile organic toxins in the environment.

Quaternary Environmental Change

Our world is changing in ways we can't control

The Quaternary Period is the last two million years and from a human perspective the most important geological period of the Earth's history. During this time man has evolved from early Hominid stock and the Earth has been devastated by a succession of wild climatic oscillations which plunged much of the northern hemisphere and the alpine regions of the southern hemisphere into a series of intense glaciations, causing the sea level to fall and rise again by as much as 150m and entire terrestrial ecosystems to migrate thousands of kilometres in response to climatic change. In Australia there was little glaciation but the climate swung from being very arid, with the formation of desert dunes, to moderately wet, with the development of large rivers and lakes.

It is generally believed that we still live in a period of fluctuating conditions, so a clear understanding of past environmental change is needed to indicate what we can expect in future. Human impact on the environment, though great, cannot be considered alone since some changes must be expected as part of the normal variability of the Quaternary Period in which we live. The Quaternary Environmental Change Program focuses on both natural and human-induced environmental change in the Australian region, aiming to use understanding of past environmental relationships to make better predictions of future ones.

A drilling rig is transported by researchers across a reef at low tide to reach the least accessible of the Cocos (Keeling) islands during research into sea-level change at coral atolls in the Pacific and Indian Oceans

Fundamental to this endeavour is establishing rates of environmental change during the period under study. Consequently much effort has been put into the establishment and operation of a thermoluminescence (TL) dating laboratory, enabling a reliable chronology to be established beyond the last few tens of thousands of years for which radiocarbon dating is considered accurate. This has achieved spectacular results in dating river (alluvial) and dune (aeolian) systems in the Eyre Basin of central Australia.

Sedimentary TL dating depends on the acquisition of luminescence energy by crystalline minerals buried within sedimentary units. This energy is derived from radiation flux delivered by long-lived isotopes of uranium, thorium and potassium found in soil and sediment, and a small amount from cosmic radiation. Successful dating is dependent on removal of the TL acquired by the sediment before its last episode of burial, a process requiring exposure to sunlight during sediment transport. Following burial, TL energy once again begins to build up at a rate commensurate with the surrounding radiation flux. As a consequence, the period of time since last exposure to sunlight can be calculated by measuring the total TL energy absorbed (the palaeodose) and dividing this by the rate at which the energy is acquired.

Thanks to this research, it is now apparent that the climate of central Australia during the Quaternary has alternated from arid during the glacial episodes (periods of low sea level with extensive glaciation in the Northern Hemisphere) to 'wet' during the interglacials. Such dramatic changes have had a profound effect on the development of Australia's flora and fauna.

Coral atolls, tropical estuaries and fire have also been the subjects of major projects within this research program.

Geomechanics

'Where there's muck, there's money'...

An initiative of special environmental significance is that concerned with the proposed production of bricks using sludge from sewage and flyash from power stations. The utilisation of these two waste products in this way has not previously been achieved. The Electricity Commission of New South Wales and Water Board (Sydney, Illawarra, Blue Mountains) have committed significant financial support for this project; it is supported also by a brick production company. Significant

A heavily protected professional officer of the Microwave Applications Research Centre controls a furnace pour. Induction heating (not in this instance microwave) provides a temperature of 1450 deg C for producing foundry iron from sewage sludge and steel-plant dusts

energy savings are anticipated in manufacture. Preliminary work is under way to outline the engineering, environmental and economic aspects of the project.

Another project, Destratification of Reservoirs, has great significance for the quality of urban drinking water. This project received external funding against keen competition from other researchers.

An integrated approach to rainfall-triggered landslides will draw on expertise in hydrological modelling of catchments, slope stability analysis and probabilistic assessment of risk of failure. This approach is systematic and innovative and is particularly useful in understanding long-term behaviour of slopes. It can also be used for analysis of catastrophic situations associated with unusual rainfall events.

Another interdisciplinary project concerns the modelling of suspending sediment transport in Australian streams. This project combines expertise in water quantity and quality modelling with that on river bank erosion and instability processes.

Geological Evolution of the Tasmanides

How minerals were folded in

Under this research program, several aspects of the geology of the Tasman Fold Belt in New South Wales and Queensland are being studied. The focus is on rocks deposited in an ancient island arc environment like that existing around the Pacific at present. Important mineral deposits occur in this island arc environment and one of the aims of the program is to contribute to understanding of the genesis of these deposits.

External funding has been received for various projects under the umbrella of this program, thanks to which a major instrumental advance has been made possible, installation of the Siroqant analytical system for the X-ray diffraction unit. This allows identification and quantitative analysis of crystalline phases in rocks and other materials. Other software purchases have made it possible to automate the identification of minerals in rocks from XRD analyses, eliminating laborious manual search, and storing all data.

Astronomy and Astrophysics

Infra-red image analysis

The group, four staff members and postgraduate students, have diverse pure and applied interests and a number of active observational, theoretical and instrumentation-development projects. Injection of major funds into the Anglo-Australian Telescope and the Australia Telescope has enabled small groups to compete scientifically on an equal basis with major international institutions and the recent acquisition of the University's own computer-controlled 16-inch telescope, equipped with photometers and a CCD camera, has enabled the group to pursue some novel research projects.

Members share an interest in image digitising and analysis and have developed a major imaging facility with software enabling analysis of infrared images from the Anglo-American Telescope and astronomical satellites. Evaluation of other possible uses has been proceeding with a view to providing an image analysis service to the community. Use has already been made of the system to provide digital images of forest canopy photographs for a trial project for ALCOA, as well as to support analysis of biological autoradiograms.

Addressing world concerns on an ever-widening range of social, economic and industrial issues is Professor Ron Johnston. With him here is Margaret Cameron, Business Manager of the Policy and Management Division of ITC

Science and Technology Analysis

Development to benefit mankind

In an increasingly integrated world, maintaining both the economic viability of nations and the long-term resilience of the natural environment requires us to be clever about how we manage the development of science and technology.

Over the past decade, Wollongong University has built up the largest concentration in the southern hemisphere of researchers working on the analysis of science and technology in their social content. In 1990 four programs, comprising 18 researchers from within the University, have united to form a 'combined program' in science and technology analysis, incidentally attracting nearly $1m in external contracts and research grants to the University. The relevant researchers are drawn from the Centre for Technology and Social Change, the Department of Science and Technology Studies and Sociology and several other departments. Their collective mission is to research the nature, dynamics, impact and management of science and technology in their social context.

Collectively the issues which are being addressed range over a challengingly wide area. Examples are the greenhouse effect, Australian international competitiveness, the technology of reproduction, the resolution of scientific controversies, the historic mechanisms which have led to current trends in science and technology, and technology management for national viability of industrial development. Researchers move freely between groupings.

Inevitably, policy guidance is an important output and objective of much STA work. Activities directed towards this end include:

- *Strategic research.* Notable among 23 primarily externally funded projects are a major study for the National Board of Employment, Education and Training, on the impact of technological change, particularly so-called fusion technologies (computer integration of electronics, mechanics and hydraulics) on the workplace; and a study funded by the Department of Industry, Technology and Commerce investigating the ways in which Australian industry is internationalising – developing and exporting goods and services for international markets. It found that the process is just beginning. Australians have become international consumers but have generally remained parochial producers. The program has identified the dimensions of the challenge for effective science and technology policies. Change is under way in industry but government has a critical role to play in stimulating and supporting restructuring.
- *Scientific controversy.* Considerable effort has been put into integrating a series of studies, applying controversy analysis to major ongoing debates about biomedical claims and the risks of various health and environmentally sensitive technologies. The three main controversies studied have been vitamin C and cancer; the Australian Animal Health Laboratory; and fluoridation. In each area, the researchers have found that they themselves quickly became involved in the controversy , becoming 'captives of controversy'. This itself has become the subject of research.

Labour Market Analysis

Worker and workplace – the facts

The changing shape of the Australian labour market in recent years has created a demand for more information about specific labour market groups at both national and regional level. Much of the work of the Labour Market Analysis group over the last year has been designed to meet these demands. The fact that several projects have been sponsored by government bodies indicates the growing demand for this research and the group's ability to supply it.

Among topics covered are the experience of recent migrants in the labour market, particularly women; women's work in general; the measurement of 'shadow wages' for inclusion in cost-

benefit studies to assess the wider community impact of natural resources projects; the impact of regulation and deregulation on the Australian labour market; the workplace in relation to the development of work practices; disadvantaged workforce groups, particularly in regional aspects; career interruptions experienced by women in relation to the earnings gap; and transition between study at TAFE and at university.

Education Policy

Higher education/performance indicators will affect decision-making

A highlight of the program's achievements in the last year was the organisation of a National Conference on Education Policy, which attracted contributions from government, business, unions and parents' organisations, as well as academia. Its aim was to clarify changing patterns of policy decisions within and across educational agencies, as well as at the interface between government, business, industry and the community. A major project is the National Study on Performance Indicators in Higher Education, commissioned by the Commonwealth Department of Employment, Education and Training, aimed at developing and evaluating a range of indicators which cover teaching, research and other professional services of academic staff in higher education institutions.

The program also includes studies on human resource development and education in the South Pacific region. This has produced a critical assessment of current educational policies in the South Pacific and their relationship with the economic development of the region, which will prove very useful in the formulation of appropriate Australian aid policies in the South Pacific. Further field work undertaken in Indonesia analysed the impact of World Bank lending for education in Indonesia.

Other policy-focused research this year has included projects on technology policies for schools, technology literacy in higher education and the structure of the newly released Aboriginal education policy and its impact at both federal and state levels. Preliminary work has started on music education policy in Australia's primary school system, NSW policies for physical education in primary schools; craft design and technology in teacher education; and teachers' understanding of education policy processes and ability to cope with change.

Protected hands at work in macromolecular research

Biological Macromolecules

Identify the trouble and beat the disease

More than 30 staff and research students from the Departments of Biology, Chemistry and Public Health and Nutrition are undertaking a number of complementary research projects focusing on the structure, function, synthesis and detection of biologically important macromolecules. Major topics studied include:

- *Macromolecules and Disease.* Four projects cover cataracts, osteoporosis, atherosclerosis and human cytomegalovirus. The last is a virus which passes across the placenta, inducing foetal abnormalities, and is found in lesions of myocaditis and atherosclerosis. Infection of immuno-compromised persons, including organ transplant recipients and HIV infected persons, leads to severe and often fatal disease. Research aimed at identifying the macromolecules involved will facilitate future development of antiviral drugs.
- *Multi Copper Enzymes.* Copper proteins play an important role in metabolism, but detailed analysis of the role of the metal atoms has been complicated by the complexity of the molecules. A valuable approach is the design of smaller model compounds in which the metal's environment mimics the environment believed to be present in the native metaloprotein.
- *Macromolecules and Biological Productivity.* Major projects in this area study algae and myxomatosis. By determining how the alga Dunaliella resists salinity, the group hopes to pave the way for a better understanding of how higher plants are affected by salinity and how they may be manipulated to improve their salt tolerance; and by studying the pathogenesis of Myxoma, particularly its effect on the immune system, to improve the effectiveness of the Myxoma virus in controlling rabbit population.

Equity in Education

We did it – so can you...

During the last year, 20 University of Wollongong students took part in a Department of Employment, Education and Training-funded 'Secondary Links Program' designed to tell secondary school students in the Illawarra region how tertiary education could benefit them. The program targeted students from non-English-speaking backgrounds, Aboriginal students, students from lower socio-economic backgrounds and young women, encouraging their enrolment in non-traditional fields of study. Reactions were positive, producing a list of factors considered encouraging or discouraging for students in their choice of senior school or tertiary study. Preliminary analysis suggests that the dominating influence is career and job prospects, but financial factors and parental influence rated highly, too. Discouraging factors were dominated by such school-related elements as dislike of school, workload, pressure of study, difficulty of courses, lack of alternatives to academic courses and lack of subject choice. Low self-esteem and lack of self-confidence were also important in discouraging wider options.

The school visits and presentations by the student role models have had a positive effect on school pupils. Post-visit surveys indicate that school students now have an increased awareness of higher education as a valid option. So successful has the Link Program proved that funding has been received from the Higher Education Equity Fund to continue it this year.

Schools Day 1990. This high-school student is using titration apparatus – a burette and an Erlenmeyer flask. In the background is Associate Professor Peter Burton

Exercise, Stress and Fitness

Work and play in a hot climate

Focus of the program is the response of the human body to external stress imposed by work or recreation. Stress can be chronic or acute, physiological or mechanical in nature, and all forms influence the body's capacity to perform physical work. This collaborative study involves three University departments, Human Movement Science, Mechanical Engineering and Psychology. It involves four research projects:

- *Exercise and Heat Stress.* In Australia's climate, many man-made and natural industrial settings expose workers to extremes of hot dry and hot humid conditions. Participation in vigorous physical recreation under these conditions is being called into question. Early stages of this project examined the general physiological and psychological effects of climatic stress, as well as the specificity of acclimatisation to heat stress.

  Research has now moved to children and adolescent responses to hot, humid conditions. Of particular interest is their perception of physical effort during exercise in this environment. From this, it is hoped to develop a set of guidelines for safe participation and acclimatisation in a thermally stressful climate.

- *Exercise and Load Stress.* The original program of research into safety aspects of rugby union scrummaging has been completed and recommendations for law changes and coaching strategies have been submitted to the Australian Rugby Union. Further research will develop an on-field assessment procedure to measure impact forces in all forms of contact sport.

- *Exercise and Rehabilitation.* The purpose of this on-going project is to ascertain the effects of aerobic strength-conditioning and cognitive strategies on pain tolerance. Practical applications may improve fitness levels and thus work attendance, productivity and satisfaction.

- *Exercise and Corporate Health and Fitness.* The focus of this project is on determining the effectiveness and efficiency in human and financial terms of a Rehabilitation Program Model implemented by BHP Slab and Plate Products. Having developed a set of indicators related to productivity and with access to computer data bases related to specific aspects of human resources, the team has started experimental implementation of an algorithm that may be used for enhancement of effec-

tiveness and efficiency within the steelworks. A survey of selected staff will enable lifestyle indicators to be determined which may interact with productivity indicators.

Contemporary Arts Practice and Performance

Drama – do audiences get what they want?

This program is concerned with several areas of the visual and performing arts in Australia. A major project focuses on constraints on interpretation in music theatre production and has now moved to an examination of the processes followed to negotiate these constraints, particularly in the realisation of new works. Works studied in recent months have included a new music theatre piece for children, *Harmony*, written by program members and commissioned by the Tasmanian Symphony Orchestra and the Salamanca Theatre Company. At the time of final rehearsals and first performances, the composer, script-writer, designer, director, musical director and others involved in the production were interviewed. These interviews, along with observation of the product, are the basis for determining the ways that an original concept has undergone change by the time of first public presentation. A second piece, *Whispers*, is being used as a continuation of the investigation.

A major constraint identified is the accepted or expected style of a piece, often built through its performance history and affecting interpretation in second and subsequent productions of new works. This aspect is being studied by comparison of the first and second performances of the new opera, *Black River*, by a member of the team.

Another project focuses on the ways in which artists perceive their own work processes. It is not clear why artists maintain an on-going commitment to their work in a society which appears not to value artistic work highly. Artists' accounts of their own work, albeit selective, can tell us much about what it means to be an artist today. This study is complemented by a number of doctoral research projects.

Interpretation of performance and production on stage is an important research theme in the School of Creative Arts

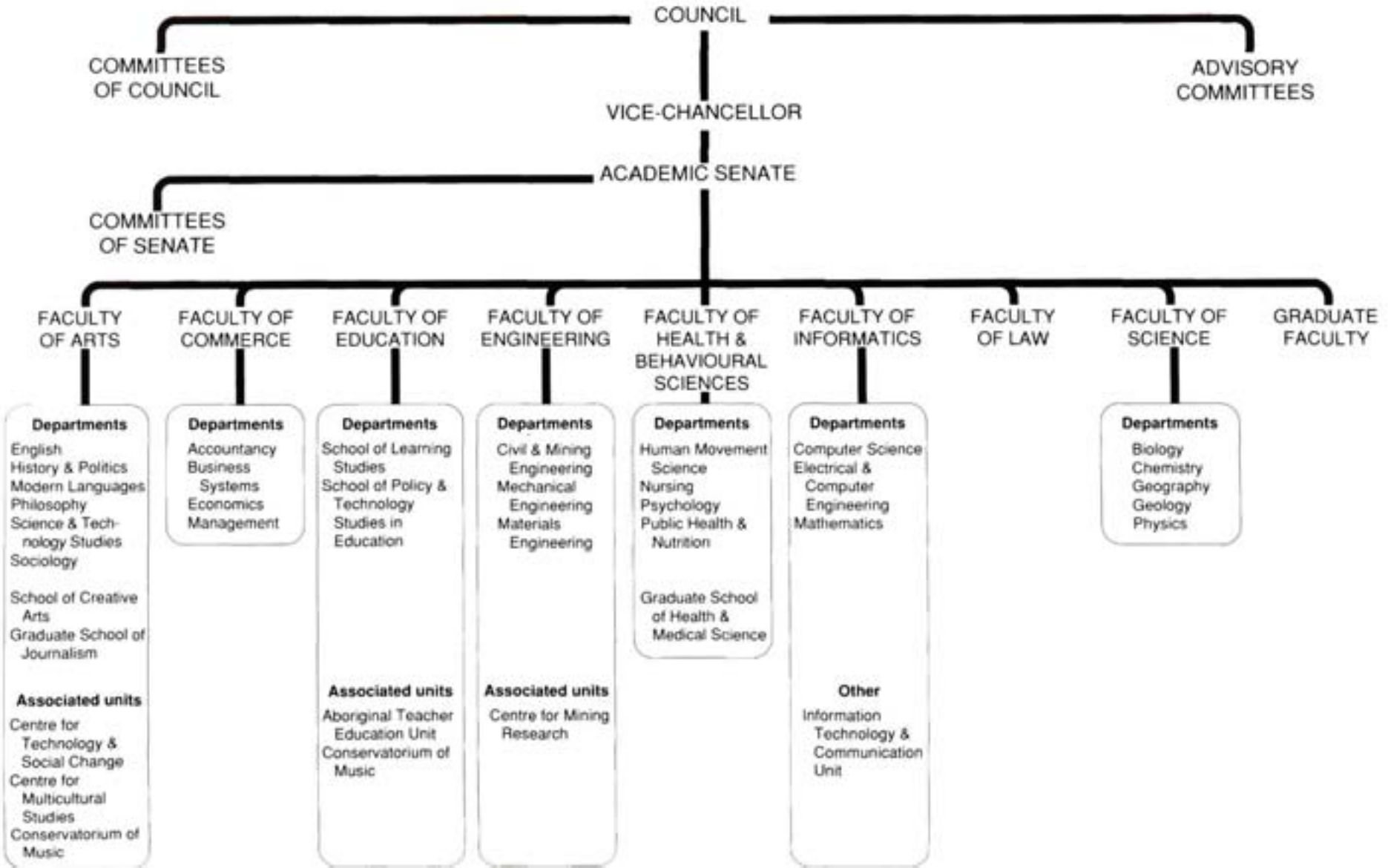
Gender Studies in Art

Naked woman – fine! Naked man – no, no!

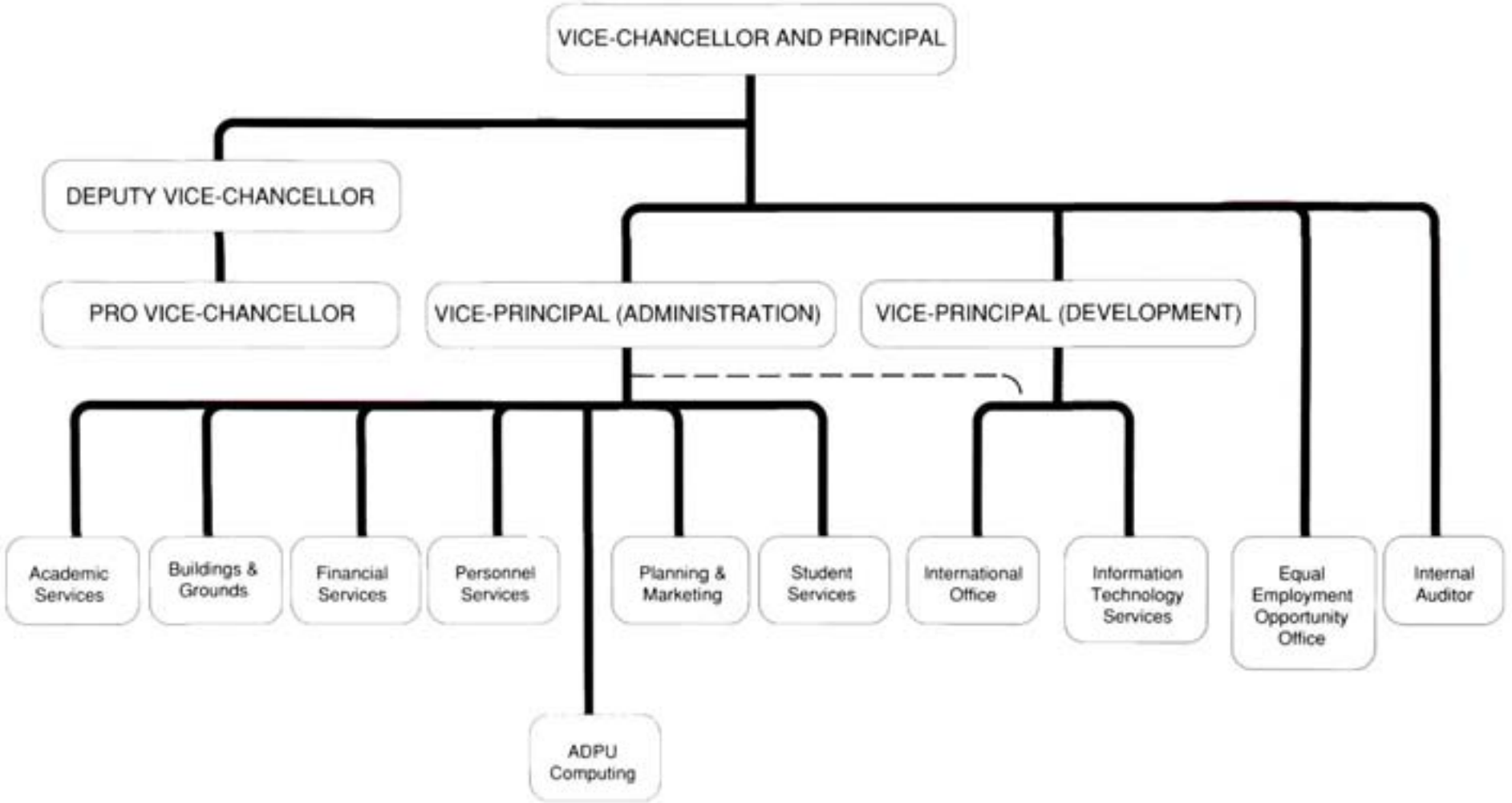
Sociological change this century has created new parameters for the definition of masculinity in Western culture. The long-standing stereotypes of men in the family and the workplace and in social interaction have given way to a new and broader set of possible roles on which males may model themselves. As a result, there is a change in the way the male image is used in visual art, reflecting a challenge to the traditional values of male heroism and also the conflicts men experience in adjusting to the new self-definition.

A post-graduate MCA student is researching the parallel impact of such changes in the way the female is depicted in art. Her study investigates the cumulative effects of visual imagery used in advertising and the movie industry in shaping and educating public thresholds of acceptability with respect to nakedness, and the social embarrassment of a public which readily accepts nude female imagery as a tradition of visual fine art, but applies a different set of standards in coming to terms with the use of naked male imagery, reflecting acceptance of the privileged role of men in our society.

Academic structure of the University



Administration of the University



ADMINISTRATION

THE *Annual Report* for 1989 commented on the introduction of a revised Senior Executive Management structure for the University. The structure, shown diagrammatically on page 71 of this Report, has now been in place for over 12 months. The Administration continues to address successfully the challenges posed by a rapidly growing and developing university within a changing environment for tertiary education generally.

The executive structure is supported by seven administrative branches, each of which is headed by a manager with specific powers and responsibilities. The areas covered by the branches are

* Academic Services, with responsibility for research and postgraduate student administration, secretariat support and ceremonial matters;
* Buildings and Grounds, with responsibility for physical planning, design and construction of buildings, site services and maintenance;
* Financial Services, with responsibility for budgetary and accounting services, business and office services, the Printery and campus security;
* International Office, with responsibility for promotion of the University overseas and the recruitment of international students;
* Personnel Services, with responsibility for academic and general staffing matters, including recruitment and industrial relations;
* Planning and Marketing, with responsibility for planning and statistics, marketing, media liaison, publications and school liaison; and
* Student Services, with responsibility for undergraduate student matters, student counselling, careers and appointments and accommodation.

Major activities undertaken within the Administration during 1990 included:

* devolution of management responsibilities to the Faculties – plans were put in place during 1990 for the devolution of certain financial and staffing decisions to the Faculties from the beginning of 1991. The intention is to increase progressively the responsibility and accountability of Faculties.
* implementation of the second stage of the University's Research Management Strategy – the first stage, which had involved reshaping the University's academic staff research effort during 1989 into cohesive groupings for more efficient and effective use of the research resources and facilities, was followed in 1990 by a restructuring of the postgraduate course-work offerings of the University into post-graduate programs, leading to a more coherent set of courses for postgraduate students.
* increased promotional activity - during 1990, the University substantially increased its commitment to the systematic marketing and promotion of the University and its activities; one element in this is the establishment of an Alumni Office which held its first meetings in Malaysia, Canberra and Wagga and more are planned for 1991. It is anticipated that chapters will be set up in a number of areas in the not-too-far-distant future.
* establishment of co-operative education scholarships – a number of scholarships, which cover enrolment and other expenses of undergraduate students, were established with local and other businesses during the year for offering to high-calibre students embarking on their studies at the University in 1991.
* continuation of the University's policy of regular reviews of academic units – reviews of two Departments, History and Politics, and Sociology were undertaken during 1990 with the aim of evaluating the current activities of theses units and setting directions for developments into the nineties.
* introduction of accrual accounting – during 1990, the University moved to accrual accounting in order to adopt a more commercial approach to the financial reporting of its activities; the most significant changes were to recognise property, plant and equipment as assets and to highlight the true state of the University in planning additions, replacement and maintenance of capital items.
* drafting of a new University By-law – as a consequence of the new University of Wollongong Act 1989 passed by the New South Wales Government, a new By-law consistent with the new Act was drawn up. The Vice-Chancellor touches on this in his introduction.
* negotiation of a new cleaning agreement – the agreement, which covers revised floor area

specifications and other changes, will lead from 1991 to significant productivity increases in the cleaning services carried out on the campus.

* improvement of parking facilities on campus – the Administration has been constantly addressing the shortage of car parking facilities on campus as student and staff numbers have grown and has been involved in a number of areas in attempting to alleviate the problems. Shuttle buses to the University from nearby locations have been arranged; a multi-storey car park is under construction from the University's own development funds; existing car parks have been extended; the number of bicycle racks on campus has been increased; and there have been negotiations with local bus companies.
* increasing the retirement age for non-academic staff – in line with the decision taken in 1989 to increase the retiring age of academic staff to 65 years of age, the retirement age for general staff was increased during 1990.
* extension of the annual performance appraisal procedures - during 1990, annual staff evaluation was extended to cover all academic and general staff.

International activities

The University continued its program of internationalising its structures, teaching, research and student composition. A conference for Deans and Heads of Departments examined the changes needed if Wollongong is to be further internationalised. Most attention was directed to building up student numbers from a diverse group of countries to provide a noticeable change to the composition of the student body. As well as participating in education fairs in South, East and North Asia staged by the Australian Trade Commission (AUSTRADE) and the International Development Program (IDP) the University has co-operated successfully with a group of tertiary institutions to market Australian education in other areas. Of particular importance has been the creation of the ACT and NSW Consortium of Universities to market in areas from which AUSTRADE began to withdraw late in the year. The University has been especially pleased to receive a group of postgraduate students from Iran as part of a co-operation program between the two countries, managed by IDP.

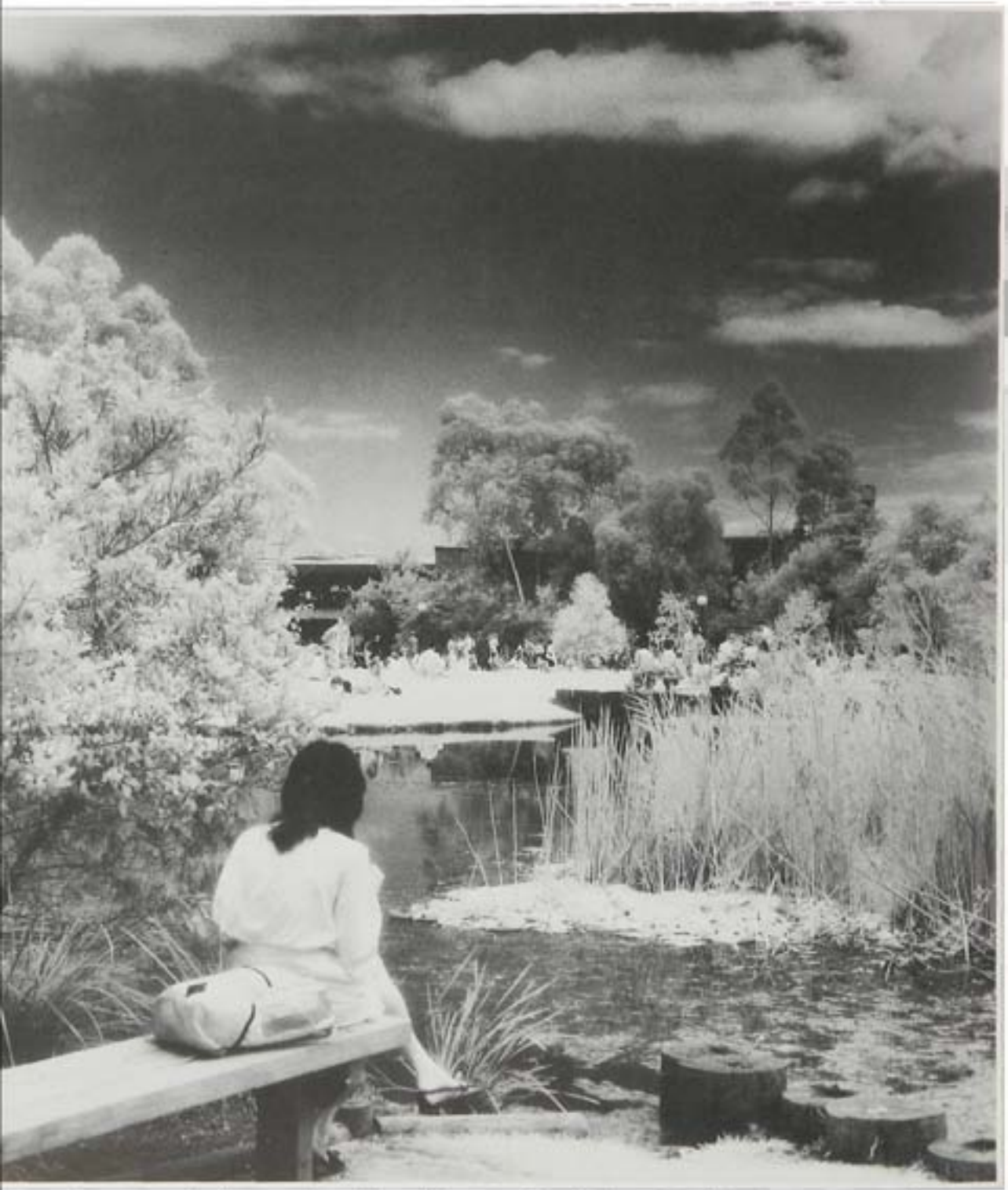
The University has also deepened its relationships with universities around the world, in particular, in Thailand and the United States of America.

During the year the Deputy Vice-Chancellor, Professor Ian Chubb, was lost to the University when he was appointed Chair of the Higher Education Council for a five-year period. A farewell dinner was held in his honour in September

Three scholarship holders from Chulalongkorn University arrived to study for postgraduate degrees. A wide variety of academic staff have visited Chulalongkorn to explore co-operation. Regular contact has been established in, for example, polymer sciences. In the United States relationships based on exchange of students have grown. In 1990 the University received 32 from US universities on exchange and 59 on a fee-paying basis. It sent 18 students to its partners. Representatives of the University attended, for the third time, the annual conference of the US-based National Association of Foreign Student Advisers.

The University's office in Bangkok, established in late 1989, began a year in new premises. Dr Stewart Houston, a former Director of the Canberra College of Advanced Education, acts as the Representative of the University in Thailand, and is responsible for managing the University's relationships there. As a result of these moves, the links with Chulalongkorn and Assumption Universities have prospered.

The year was one of uncertainty so far as Australian Government policy towards overseas students was concerned. Foreshadowed changes to visa regulations created confusion in some Australian diplomatic posts. The high cost of visas created ill-will. The establishment of the Australian Education Centres throughout Asia, valuable in themselves, cut across existing marketing relationships and created further uncertainties for students and institutions. At the same time, Australia's competitor countries, in particular the USA, have made entry easier and enhanced opportunities for students to remain after their degrees to gain work experience. Australia no longer has a competitive advantage in attracting international students. The prospects beyond 1991 do not look encouraging – unless the Australian Government acts to simplify entry to Australia for university students.



Everyone is of course familiar with *trompe l'oeil*, the trick of deceiving the eye by means of a drawing or painting to make things appear as they are not. The picture above, apparently showing snow on the Wollongong campus, is an example of *trompe l'oeil* by Simone Rose, the University photographer. Simone has used infra-red phenonema to make dark colours in the frame light and light shades dark – and so produce the effect, on a sunny summer's afternoon, of storm clouds presaging more snow on the duckpond lawns and shrubs....

COUNCIL 1990

ATTENDANCES

	Possible	Attended	Apology/ Leave
Ex Officio			
The Hon. R M Hope	6	6	
Professor K R McKinnon	6	5	1
The Chairperson of the Academic Senate, Prof. H Gamble	6	5	1
Elected by NSW Legislative Council			
The Hon. Mr E P Pickering, MLC	4	2	2
The Hon. S Mutch, MLC	2	1	1
Elected by NSW Legislative Assembly			
Mr C J Downey, MLA	6	2	4
Ministerial Nominees			
Dr B S Gillett	6	6	
Ms S L Chapman	6	6	
Mr R J Oxley	6	4	2
Mr G M Parker	6	3	3
Appointed by Council			
Mr R D Somervaille	3	2	1
Elected by the Students of the University			
Mr D Morrissey	6	5	1
Elected by Convocation			
Mr G W Butler	6	5	1
Ms S A Nixon	6	6	
Assoc. Prof. R W Upfold	6	6	
Dr W L Ward	6	6	

	Possible	Attended
Elected by the full time Academic Staff of the University		
Dr M J Lowrey	6	6
Dr J R Panter	6	6
Elected by the full time General Staff of the University		
Mr R Parker	6	6

GRANTS AND DONATIONS

Australian Research Council Grants

Faculty of Arts

Creative Arts

Dr P Shepherd
Contemporary Arts Performance and Practice in Australia $11,180

English

A Prof J M Wieland
Literature and the Colonial Legacy $9,942

History

Dr S Piggin
Australian Evangelicalism – A Bicentennial History $20,898

Languages

Prof B Moloney
The Discontinuous Tradition: Development of the Novel in Italy $30,000

Science and Technology Studies

Dr R J Badham and Dr T Williams
The Design of Human Centred Forms of Computer Integrated Manufacturing $7,838

Prof J Falk
Preconditions for the Successful Development, Transfer and Application of Expert Systems inAustralia $10,500

Dr I Reinecke
Comparative Cost, Efficiency and Equity of Electronic Data Systems and Printed Media in the Disseminationof Information from Government Resources $13,000

Sociology

Prof S C Hill
Historical Analysis of Technology – Culture Relationships in Australia $28,161

Faculty of Commerce

Accountancy

Prof M Gaffikin
Accountability and Financial Reporting $12,620

Economics

A Prof D Lewis and Dr C Nyland
Physical Differences Between Males and Females and the Sexual Division of Labour $28,000

Dr E Wilson and Dr J Pol
The Wage/Tax Trade-off: Theoretical Development, Econometric Estimations and Policy Simulations $11,000

Centre for Transport Policy Analysis

Prof R Robinson and Dr K Trace
Australian Flag Competitiveness and National Maritime Policy $34,000

Faculty of Education

Learning Studies

A Prof B Cambourne
Applied Cognitive Studies $14,890

A Prof N J Kyle
Equity in Education $13,000

Faculty of Engineering

Civil and Mining Engineering

A Prof R N Chowdhury
Slope Stability and Risk Assessment $34,000
Water Engineering and Geomechanics $11,800

Dr R Kohoutek
Full Scale Test of Semi-Rigid Joints for Steel Frames under Dynamic Load $50,000

A Prof Y C Loo
Punching Shear Failure at Corner and Edge – Columns of Reinforced Concrete Flat Plates with Spandrel Beams $33,115
Structural Engineering and Construction $9,000

Materials Engineering

Dr T Chandra
Study of Recrystallization and Precipitation in Hot Worked Copper $26,000

Dr G W Delamore
Crystallisation Kinetics of Metallic Glasses $35,000

Prof D P Dunne and A Prof N F Kennon
Research and Development of Iron-based Shape Memory Alloys $28,000

Prof W J Plumbridge
Residual Stress Effects on Fatigue Crack Growth in Structural Steels $36,867

Mechanical Engineering

Dr W K Soh and Dr N Smyth
Cavitation Bubbles Near Compliant Boundaries $13,300

Dr A K Tieu
Superlaminar Flow in Hydrodynamic Thrust Bearings $39,225

Faculty of Health and Behavioural Sciences

Human Movement and Sports Science

Dr P D Milburn
Stress and Fitness $14,800

Psychology

Prof W J Lovegrove
The Role of Spatial Frequency Mechanisms and Attention in the Global Precedence Effect in Control and Specifically Disabled Readers $30,000

A Prof L L Viney
Social and Psychological Health $14,980
The Process of Counselling $20,000

Faculty of Informatics

Mathematics

A Prof M Bunder
Combinations, Types and Applications $15,000

Dr P J Davy
Non-Ransom Breakage of Raw Materials $150,000

Prof D A Griffiths
Applied Statistics Research $5,688

Prof J M Hill
Integral Formulations and Bounds for Heat Diffusion Moving Boundary Problems $29,000

Faculty of Science

Biology

Dr D J Ayre
Factors Determining the Genetic Structure of Populations of the Sea Anemoni $36,100

A Prof A J Hulbert
Australian Flora and Fauna $22,000

A Prof R McC Lilley
The Molecular Biology and Osmoregulation of the Marine Alga Dunaliella $25,000

Dr R J Whelan and Dr D J Ayre
Genetic Consequences of Plasticity of Mating Systems in the Proteaceae $37,500

Chemistry

Dr P T Crisp
Specialisation of Airborne Selenium $5,150

Dr M J Garson
Chemistry and Biochemistry of Marine Invertebrates from the Illawarra Region $32,000

Dr P T Murphy
Production of Bioactive Metabolites by Marine Sponges – *In Vitro* and *In Vivo* $36,000

Prof L Kane-Maguire
Kinetics and Mechanisms of Metal Carbonyl Cluster Reactions $30,000

Prof L Kane-Maguire, Dr M Garson and Dr S Pyne
NMR Structural Studies on Bioactive Molecules $100,000

Prof L Kane-Maguire, Dr S G Pyne and Dr J Carver
Organometallic Complexes as Reagents in Peptide Synthesis and Modification $36,000

Dr S G Pyne
Assymmetric Sythesis of Chiral Alkaloids from Chiral B-Amino Sulfoxides $20,000

Prof G G Wallace and Dr A Hodgson
Chemistry and Electrochemistry on Conducting Electractive Polymers $35,000
Intelligent Polymeric Materials $10,100

Geography

A Prof G C Nanson, Dr C Woodroffe and A Prof B G Jones
Quaternary Change in Australian Riverine and Estuarine Environments $62,000

A Prof R W Young and Dr D M Price
Quaternary Studies of Stream Development in Central and Eastern Australia $15,600

Dr H M Winchester
Socio-Economic and Spatial Marginalisation of Australian One-parent Families $8,200

Dr C D Woodroffe and Dr R F McLean
Sea-level Change, Geomorphology and Late Quaternary Development of Cocos Islands $23,000

Geology

Dr P F Carr, Dr C L Fergusson and A Prof B G Jones
Relationship Between Plutonism, Volcanism and Tectonics in the Southern Wollondilly Shire $11,000

A Prof B G Jones, A Prof G C Nanson and Dr R W Young
The Gilbert Fandelta – An Integrated Sediment-

ological, Geomorphical and Chronological Study of a Tropical Monsoon River System $18,500

Dr L E Jones
Laboratory Investigation of the Elastic Properties of Coal $16,000

A Prof A J Wright
Macro-Invertebrate Lineages in Devonian Biostratigraphy $10,500

Physics

Dr K J Duff, Prof P Fisher, Dr C A Freeth and Dr R A Lewis Electronic and Vibrational Spectra of Solids $70,000

Dr W J Zealey and Dr G K Moore
Digitisation and Image Analysis of Astronomical Images $32,212

National Energy Research Development and Demonstration Council

Microwave Applications Research Centre

Prof H Worner
Evaluation of Microwave Retorted Shale Oil $75,214

National Health and Medical Research Council Grants

Faculty of Health and Behavioural Sciences

Public Health and Nutrition

Prof G D Calvert and Dr D R Turner
Characterisation of Human Lipid Transfer Protein $43,945

Facilty of Science

Biology

Prof H M Garnett
Interaction of Human Cytomeglavirus with Peripheral Blood Monocytes $41,942

A Prof A J Hulbert, Prof I W Chubb and Dr G Sullivan-Tailyour
Gamma Counter for Biomedical Research Projects $20,620

Dr E J Steele and Dr G W Both
Mechanism of Somantic Hypermutation in Antibody Variable Region Genes in Mice $43,905

Dr G Sullivan-Tailyour
Identification of the Virus and Host Protein Molecules Mediating Attachment and Penetration of Human Cytomegalovirus $37,474

Chemistry

Dr R J Truscott, Dr I E Gan and Dr A J Elderfield
Tryptophan Metabolites in Normal and Diseased States $20,858

Mechanism of Senile Nuclear Cataract in Man $47,113

Vice-Chancellor's Unit

Prof I W Chubb and Dr I G Morgan
Neurotransmitters in the Retina: An Understanding of Complex Interactions $38,275

CSIRO/University of Wollongong Collaborative Scheme

Faculty of Engineering

Materials Engineering

Dr G W Delamore and Dr C Forwood
Rapid Solidification Processing of Copper Based Alloys $4,000

Mechanical Engineering

Dr P Cooper and Dr A Delsante
Monitoring and Modelling of Thermal Performance and Atria and Large Glazed Spaces $8,000

Dr E Siores
Expert Systems for Intelligent Ultrasonic Inspection $8,000

Dr Y Yao and Dr S Grewal
Mating Motion Planning for Robot Aided Assembly Involving Non-cylindrical Parts $20,000

Faculty of Science

Biology

Prof H M Garnett and Dr R Jackson
Effect of Myxoma Virus on the Immune Systemof Rabbits $10,000

Dr E J Steele
Mechanism of Somatic Hypermutation in AntibodyVariable Region Genes $10,000

Other Research Grants

Faculty of Arts

Creative Arts

Art by Australians - Australia Council

Ms S Rowley
Artists Residencies, Exhibition etc $20,401

Sociology

Stepan Account (DITAC)
Prof S C Hill
Challenge Grant (Stepan Consultancy) $95,000

Faculty of Commerce

Economics

Australian Centre for Industrial Relations, Research and Teaching
Ms D Kelly
Fulfillment of ACIRRT Research Need in Expanding Teach Resources of Industrial $5,000

Australian Longitudinal Survey Research
A Prof D Lewis
Estimation of the Extent and Impact of Career Interruptions Using the ALS $6,000

Department of Industrial Relations
A Prof R Markey
The Work Change Training Scheme $46,823

Faculty of Education

International Literacy Year Grants
Mr P F Farrar and Mr R W Colvin
Write for Kids: Write with Kids $2,000

Faculty of Engineering

Civil and Mining Engineering

Joint Coal Board
Prof R Singh
Longwall Dust Extraction Research $50,000

Cement and Concrete Research Association
Dr R Kohoutek
Dynamic Performance of Railway Track $6,000

Alminco Pty Ltd
Prof R Singh
Evaluation of Australian Roof Bolting Practices and Technology $4,500

Materials Engineering

Electrical Research Board
Prof W J Plumbridge
Fatigue-Creep Interactions in Low Alloy Steels $12,000

Mechanical Engineering

Department of Defence - Materials Research Laboratory
Dr W K Soh
Scale-model Study of Underwater Explosion Bubbles $36,800

Electrical Research Board
Dr A Basu and Dr T Chandra
Prestressing Overhead Conductors $40,000

Faculty of Health and Behavioural Sciences

Human Movement Science

National Heart Foundation
Prof P Barter
Studies of a High Density Lipoprotein Conversion Factor $39,783

National Heart Foundation
Prof P Barter
Substrate Specificity and Mechanism of Action of the High Density Lipoprotein $33,679

Applied Sports Research
Dr M Anshel
Effects of Aerobic and Strength Conditioning and Cognitive Strategies on Pain Tolerance as a Function of Pain Location, Gender and Selected Personality Traits $22,500

Psychology

RADGAC - Department of Community Services and Health
A Prof L L Viney
Terminal Care Services: An Evaluation $35,000

Public Health and Nutrition

Public Health Research and Development Committee
Prof C Ewan and Dr E A Bryant
Workshop on Potential Health Effects of Climate Change $11,965
Environmental Health Project $8,500

Public Health Research and Development Committee
Dr E A Bryant
Long-term Atmospheric Changes and Public Health $34,308

NSW Cancer Council
Prof C Ewan
Process Evaluation of Comprehensive Mainstream Palliative Care Service in the Illawarra $25,000

Faculty of Education

School of Learning Studies

National Significance Program
Prof K Gannicott
Cooperative Policy for the Application of Distance Learning to Inservice Education $150,000

Evaluations and Investigations
Prof R C King
Evaluation of School Industry-linked Programs and Staying-on Programs in Australian Universities $31,500

National Languages Institute
Ms B M Derewianka
Inquiry into Language Other than English (LOTE) Teacher Employment and Supply $7,840

Faculty of Informatics

Electrical and Computer Engineering

Electricity Commission
Prof C Cook
Elcom Energy Efficiency $50,000

Generic Industry Research and Development
Prof C Cook and Dr P Carter
Programmable Array Manipulator (PAM) $485,773

Electrical Research Board
A Prof V J Gosbell
Harmonic Behaviour of Power System Loads $47,000

Electrical Research Board
Dr M A Magdy and Dr D Platt
A New Approach to Adaptively Tune A PSS for Generators Subject to Large Changes in System Configurations $15,544

Generic Industry Research and Development
A Prof T S Ng and Mr A Perkis
Speech Coding and Transmission Research $271,957

Australian Telecommunications and Electronics Research Board
A Prof T S Ng and A Prof F J Paoloni
Video Transmission Rate Reduction by Hybrid and Interpolative Coding Technicques $7,000

Electrical Research Board
A Prof T S Ng and A Prof F J Paoloni
To Develop a Knowledge Acquisition System for Expert System Construction $5,000

Australian Institute of Nuclear Science and Engineering
A Prof F J Paoloni
Development and Application Studies on a Metal Vapour Vacuum Arc Ion Implanter $700

Australian Telecommunications and Electronics Research Board
Mr A Perkis
Low Bit Rate Speech Transmission for a Satellite Channel $6,000

Mathematics

National Teaching Company Scheme
Prof J M Hill
Heat Treatment in the Continuous Processing of Steel $10,000

Faculty of Law

Legal Studies

Law Foundation of New South Wales
Prof H Gamble
Youth Legal Education Program $47,236

Faculty of Science

Biology

Ethel Mary Read Research Grants
Dr R J Whelan and Ms D Andrew
Study on Tiger Quolls $600

Joyce W Vickery Scientific Research Grants
Dr R J Whelan and Mr S Krauss
PhD Study on Persoonia $500

Murray-Darling Freshwater Research Grants
Dr D J Ayre and Dr J Chaplin
Reproduction and Dispersal of the Freshwater Ostracod Candocyris Novae $1,787

Victorian Institute of Marine Biology
Ms A Hunt
Geographic Variation in Two Species of Intertidal Starfish $1,230

Linean Society of NSW
Ms A Hunt
Evaluation of Intertidal Starfish $450

Roslyn Muston and Associates
Mr G Philipson
Environmental Research by Graeme Philipson $3,000

Linnean Society of NSW
Ms S Schibeci
Observation of Pollinators for Banksia Robur and Banksia Oblongifolia $500

Roslyn Muston and Associates
Dr R J Whelan
Illawarra Greenhood Orchid $6,500

National Estate Grants
Dr R J Whelan
Evaluation of Remnant Vegetation Patches and their Faunal Populations in the Bega Valley $4,000

Chemistry

The Royal Society, London
Dr M J Garson
Secondary Metabolites as Membrane Components in Marine Sponges $600

Smith, Kline, Beecham
Dr M J Garson
Collection and Extraction of Marine Organisms $10,000

Joint Funding MISST Project
Dr D W T Griffith
Measurement of Cape Grim Baseline Air Pollution Station $14,100

Wellcome Ltd
Dr R W Truscott
Cataract Research/Uniadvice $47,080

Government Assistance for Medical Research Fund
Dr R W Truscott
Discovering the Cause of Senile Nuclear Cataract in Man $4,000

Geography

James Cook University of North Queensland
Dr C D Woodroffe
Inqua Quaternary Shorelines $200

NT Conservation Commission
Dr C D Woodroffe
Mapping of the Geomorphology of the Mary River Floodplains $30,000

Quanternary Research
Dr L M Head
North Queensland Research Project (University of New England) $4,052

Physics

Australian Institute of Nuclear Science and Engineering
Dr J N Mathur
Calculation of the Energy Spectrum of Neutrons Released in Fission using a Cascade Evaporation Model $5,000

Centres

Centre for Multicultural Studies

Bureau of Immigration Research
A Prof J Mangan
Labour Market Experience of Recent Female Migrants $75,147

Bureau of Immigration Research
Mr M Morrissey
The Settlement Needs of the Family Unit Study $53,429

Bureau of Immigration Research
Mr M Morrissey and Prof S C Castles
Immigration and Industry Restructuring in the Illawarra $55,088

Bureau of Immigration Research
Dr D Tait
Client Information System for Migrant Welfare Workers $49,953

Bureau of Immigration Research
Prof S Castles
Immigration, Ethnic Conflict and Social Cohesion Publication of Multiculturalism Papers $10,539

Bureau of Immigration Research
Prof S Castles and Dr Harrison
Language Services Needs and Demands $10,766

Bureau of Immigration Research
Dr W Cope and Ms M Kalantzis
Research Consultancy on Language Services and Needs $49,761

Centre for Work and Labour Market Studies

South Coast Employment Research
A Prof J Mangan and A Prof J Markey
Develop SCEDP Illawarra Model $36,800

Donors and Benefactors

	$
Mary Wade History Association – Mary Wade Memorial Trust	2,610
Wollongong Finnish Society Prize	1,500
Prof H K Worner Prize	2,000
Estate Late Orestis Trikas Prize	2,359
Metal Manufactures Scholarship	1,200
Joint Coal Board Prize	500
Kembla Coal and Coke Scholarship	6,600
BHP Coated Products Division Prize	1,680
BHP (Slab and Plate Products Division) Prize	5,000
Ansto Scholarship	4,000
CSIRO Scholarship	20,000
Graham Bell & Bowman Scholarship	1,200
IBM Prize	200
Office Supplies Company Scholarship	1,200
Bevans Real Estate Scholarship	1,500
Australian Institute of Mining and Metallurgy Prize	300
Western Mining Corp Prize	300
Australian Institute of Metals Prize	300
Blue Circle Southern Cement Prize	30
Commonwealth Banking Corporation Prize	50
BHP Colorbond Prize	100
Metal Manufactures Prize	200
Institute of Metals Prize	200
AFUW Illawarra Branch - Gina Savage Prize	200
Australian Society of Accountants Prize	750
B C Moldrich - Des Davis Prize	100
IMB Society Scholarship	3,600
Cleary Bros (Bombo) Pty Ltd Scholarship	1,200
Kiama Municipal Council Scholarship	1,200
Illawarra Credit Union Scholarship	10,000
S Nixon - Eric D Young Prize	815
Illawarra Planetarium Society	6,000
Estate Late Janet Louise Cosh	195,954
Kirby Foundation	3,000
BHP (Slab and Plate Products Division) - Conservatorium Sponsorship	10,000
The Illawarra Hospital Prize	1,200
Friends of the University of Wollongong – Ethel Hayton Scholarship	1,160
Wollongong City Council - Ethel Hayton Scholarship	500
Postgraduate Scholarships	
BHP	23,837
OTC	18,750
NHMRC	3,959
Transport Workers Union	17,000
Australian Wool Corporation	44,007
National Australia Bank Limited	15,000
BHP - Melbourne Research Laboratories	19,100
Bisalloy Steels Pty Ltd	6,000
Bunge Industrial Steels Pty Ltd	8,000

PUBLICATIONS

SOME notable additions and improvements distinguish the University's publications list in 1990. All existing annual publications, notably this – the *Annual Report* – and the *Research Report*, appear in fresh dress, and with changed emphasis to reflect expansion of University activities. In addition, several new publications have been produced to meet the demands of a changing national and international scene.

The *Annual Report* satisfies the requirements of government by describing all activities of the University in some detail. It is complemented by the University *Calendar*, published as usual in three volumes:
Vol. 1: Legislation: contains the University of Wollongong Act and By-law;
Vol. 2: Undergraduate Calendar (see below);
Vol. 3: Postgraduate Calendar (see below).

The *Undergraduate Calendar* is a comprehensive guide to undergraduate courses and contains Bachelor Degree, Diploma and Associate Diploma regulations. The *Postgraduate Calendar* is a comprehensive guide to postgraduate courses and contains Graduate Degree and Diploma and Associate Diploma regulations. It also lists subject schedules and descriptions.

The *Research Report* not only details new programs and projects, many interdisciplinary, but also summarises progress on research work already in hand.

The *Prospectus*, produced by the Planning and Marketing Branch, describes the University and its facilities as well as courses available to intending students. It has been expanded for 1991 to include details of graduate programs and scholarships as well as a section on graduates of the University and their careers. In addition, a pocket *Guide for Students* is now available. This covers the things new students need to know about the University, including session dates, history, a guide map and list of useful telephone numbers.

A warm welcome has been given to a new publication, *Profile*, which complements the *Annual Report* on the University's activities with a wealth of full-colour illustrations and a large coloured guide-map. Its eye-catching green wrap-round cover was designed around artwork by Creative Arts lecturer Laurens Tan to convey, in

the Vice-Chancellor's words, 'some of the dynamism of the campus community... If some of the flavour of the University and of the region, which give those of us lucky enough to share in them so many advantages, has been captured for the reader, then *Profile* will have achieved its purpose.' An equally enthusiastic reception has been given to the first *Annual Report* of the Illawarra Technology Corporation Ltd (ITC). Its contents include reports of the work of the Corporation's various specialised divisions, directors' reports and full financial statements. Both these new publications run to 32 pages.

Not new, but greatly changed, is the University's alumni magazine, formerly the *Gazette*, now renamed *Wollongong Outlook*. It has been increased in size from 12 pages to 24 to reflect a more holistic perception of the role of graduates in Australia and abroad and within the community at large.

Most widely seen of the University's publications is *Campus News*, an eight-page A4-size newsletter recording the day-by-day activities of the University. It is published weekly during the academic year. As a link between Administration and the university community, between faculty and faculty, the journal provides a much-valued service. Today it travels outside the campus boundaries in its role as valuable news provider to alumni, Friends of the University, other universities, the press and certain areas of government and industry.

BUILDINGS AND SITE DEVELOPMENTS

IN DECEMBER, Blocks A and B of the Commonwealth Government-funded $10.5m General Purpose Academic Building were completed. Blocks C and D are scheduled for completion in April 1991. The building in total provides 4400 m^2 of usable floor area.

Blocks A and B provide critically needed additional academic offices and general purpose teaching space, particularly for the rapidly growing Faculty of Commerce and the new Faculty of Law.

Blocks C and D provide a 450-seat multi-purpose lecture theatre and in addition a large stage and backstage facility to be used for theatre performances and work space for the School of Creative Arts.

During April, construction began on a Commonwealth Government funded $7.2m General Science Building. The building, scheduled for completion by the end of 1991, will provide 3000 m^2 usable floor area for the Faculty of Science, mainly teaching laboratories for chemistry, geology and physics.

Other major projects which were undertaken during the year and funded by the University include:

- Stage 3 extension to the Kooloobong student accommodation complex. This $2.7m project, construction of which started in 1989 and was completed in April 1990, provided an additional 100 places in self-catering unit-style accommodation. The project was funded from University development fund and a loan.
- Stage 2 extension to the Illawarra Technology Centre Building. The extension provides additional space for the technologically advanced activities being nurtured by the Technology Centre. It was completed in August at a cost of $4.8m met from the University development fund and a loan.
- Extension of the dining room at Campus East Student Accommodation Complex. The facility was completed in June at a cost of $228,000.
- A 50 metre swimming pool at the University Recreation Centre, for recreational and educational purposes, particularly for physical education, sports science and human movement, was completed in September at a cost of $710,000. This project was funded from University development fund and a loan raised by the Recreation and Sports Association.
- Stage 3 extension to the Illawarra Technology Centre Building. Construction began in February 1990 and was scheduled for completion in January, 1991, the total cost of the extension being $3.7m, funded from University development fund and a loan.

The Science building – project cost – $7.2 million

General-purpose academic building – project cost – $10.5 million

- A car park for 65 vehicles was developed at a cost of $87,000 on land leased from the Wollongong City Council. The new car park was in use in September.
- A Warden's Residence was constructed at the Weerona Student Accommodation College. The project was completed in October at a cost of $150,000.
- A multi-level car park, combined with an extension (Stage 6) to the Union Building, was constructed at a cost of $4.5m. Funds were provided from University development fund and a loan.
- Landscaping work to the value of $407,000 has been completed in the vicinity of and in association with major building projects.

During 1990, the University also advanced the planning of other essential buildings in anticipation of funds being available in the future.

Summary of Commonwealth Government Grants

Major Projects

General Purpose Academic Building (Building 40) – total project cost $10.5m – 1990 Grant $6.8m.

General Science Building (Building 41) – total project cost $7.2m – 1990 Grant $2.3m.

Minor Building and Site Development Projects **$**

- Modifications to University Amphitheatre $4,220
- Upgrading of fume cupboards to comply with new regulations 69,000
- Landscaping associated with (but not funded by) major building program 108,000
- Refurbishment of part of building to provide an animal house facility (part funded from 1989 Minor Works funds) 104,000
- Roof repairs to Building 6 20,000
- Re-roofing of Building 101 13,000
- Rectification of concrete spalling Building 1 18,500
- Relocation of Geology Annexe 33,500
- Alterations to provide space for Graduate School of Journalism 21,600
- Upgrading of electrical supply to Building 25 9,800
- Dismantling of 'Drama Hut' 9,000
- Installation of data cabling in library 4,500
- Additional external lighting on main campus 54,000
- Installation of emergency lighting in library 15,200
- Alterations to provide additional offices in Building 25 15,500
- Refurbishment of Building 14 (lecture theatre) 65,000

$564,820

University Land

Main campus

Lot 210 DP, 801683
Area: 82.04 ha
Land use: University buildings, education and research activities
All land is essential to University's operations
Land value (VG) $4,400,000

International House

Hindmarsh Avenue, Gwynneville (Wollongong)
Lot 41 in DP546239 Vol 11543 Fol. 188

Lot 42 in DP546239 Vol 11543 Fol. 189
Lot 1 in DP546474 Vol 11619 Fol. 167
Lot 13 in DP585083 Vol 13585 Fol. 56
Area: Approximately 1.2 ha
Land use: Students' residential college
Land is essential to the University's operations
Land value (VG) $150,000

Residence for Vice-Chancellor

2 Parrish Avenue, Mt Ousley
Lot 17DP24098
Area: 0.2023 ha
Land use: Vice-Chancellor's Residence
Residence required under terms of appointment
Land value (VG) $150,000

Other off-campus property

Lot 1 Porter Street, Gwynneville (Wollongong)
Certificate of Title Reg. Book No. Vol 4945 Fol 128
Area: 882m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $100,000

49 Northfields Avenue, Gwynneville (Wollongong)
Lot 6 DP36218 Vol 13318 Fol. 14
Area: 525m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $44,000

1 Northfields Avenue, Gwynneville (Wollongong)
Lot 5 DP36218 Vol 18720 Fol. 37
Area: 548m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $44,000

53 Northfields Avenue, Gwynneville (Wollongong)
Lot 4 DP36218 Vol 11029 Fol. 17
Area 545m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $44,000

55 Northfields Avenue, Gwynneville (Wollongong)
Lot 3 DP36218 Vol 13318 Fol. 13
Area: 575m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $44,000

18 Madoline Street, Gwynneville (Wollongong)
Lot 14 DP36215 Vol 13330 Fol. 166
Area: 668m2
Land use: Building accommodation for University education/research activities
Land is essential to the University's operations
Land value (VG) $49,000

Weerona (Halls of Residence)
12 Macquarie Street, Wollongong
Part Lot B
DP160926
Conveyance Book 1875
Number: 753 (residue)
Area: 1.171 ha
Land use: Student residential accommodation
Land is essential to the University's operations
Land value (VG) $1,150,000

Fairy Meadow Facility (Campus East)
Cowper Street, Fairy Meadow
Lot 1
DP719865, Parish of Woonona
County of Camden
Folio Identification 1/719865
Area: Approximately 12.02 ha
Land use (part): Student residential accommodation
Land is essential to the University's operations
Land value (VG) $1,100,000

Table 1

ENROLMENTS IN UNIVERSITY COURSES 1990

By Course Type, Sex and Attendance Mode

Doctor of Philosophy	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Creative Arts	3	2	5	4	1	5	–	–	–	7	3	10
Multicultural Studies	–	1	1	1	–	1	–	–	–	1	1	2
English	2	4	6	2	–	2	–	–	–	4	4	8
History and Politics	4	2	6	3	–	3	–	–	–	7	2	9
Languages	1	–	1	–	–	–	–	–	–	1	–	1
Philosophy	–	–	–	1	–	1	–	–	–	1	–	1
Sociology	1	1	2	2	1	3	–	–	–	3	2	5
STS	6	1	7	3	2	5	–	–	–	9	3	12
Faculty of Arts	**17**	**11**	**28**	**16**	**4**	**20**	**—**	**—**	**—**	**33**	**15**	**48**
Accountancy	2	–	2	–	1	1	–	–	–	2	1	3
Economics	2	1	3	1	–	1	–	–	–	3	1	4
Business Systems	2	–	2	4	1	5	–	–	–	6	1	7
Management	4	–	4	2	2	4	–	–	–	6	2	8
Faculty of Commerce	**10**	**1**	**11**	**7**	**4**	**11**	**—**	**—**	**—**	**17**	**5**	**22**
Learning Studies	3	3	6	10	7	17	–	–	–	13	10	23
Policy and Tech. Studies	–	1	1	3	4	7	–	–	–	3	5	8
Faculty of Education	**3**	**4**	**7**	**13**	**11**	**24**	**—**	**—**	**—**	**16**	**15**	**31**
Civil & Mining Engineering	13	2	15	4	–	4	–	–	–	17	2	19
Materials Engineering	8	2	10	3	1	4	–	–	–	11	3	14
Mechanical Engineering	10	–	10	3	–	3	–	–	–	13	–	13
Faculty of Engineering	**31**	**4**	**35**	**10**	**1**	**11**	**—**	**—**	**—**	**41**	**5**	**46**
Public Health and Nutrition	–	–	–	2	–	2	–	–	–	2	–	2
Human Movement Science	1	–	1	1	2	3	–	–	–	2	2	4
Psychology	3	5	8	3	6	9	–	–	–	6	11	17
Faculty Hlth & Behav. Sci.	**4**	**5**	**9**	**6**	**8**	**14**	**—**	**—**	**—**	**10**	**13**	**23**
Computing Science	1	–	1	2	–	2	–	–	–	3	–	3
Elect. & Comp. Engineering	5	3	8	5	1	6	–	–	–	10	4	14
Mathematics	4	1	5	–	–	–	–	–	–	4	1	5
Faculty of Informatics	**10**	**4**	**14**	**7**	**1**	**8**	**—**	**—**	**—**	**17**	**5**	**22**
Biology	9	6	15	1	2	3	–	–	–	10	8	18
Chemistry	9	2	11	5	1	6	–	–	–	14	3	17
Geography	1	–	1	2	–	2	–	–	–	3	–	3
Geology	7	–	7	3	1	4	–	–	–	10	1	11
Physics	6	1	7	2	1	3	–	–	–	8	2	10
Faculty of Science	**32**	**9**	**41**	**13**	**5**	**18**	**—**	**—**	**—**	**45**	**14**	**59**
COURSE TYPE TOTAL	107	38	145	72	34	106	—	—	—	179	72	251

Doctorates	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Creative Arts	9	6	15	14	1	15	–	–	–	23	7	30
Faculty of Arts	**9**	**6**	**15**	**14**	**1**	**15**	**—**	**—**	**—**	**23**	**7**	**30**
Psychology	–	1	1	1	1	2	–	–	–	1	2	3
Faculty Hlth & Behav. Sci.	**—**	**1**	**1**	**1**	**1**	**2**	**—**	**—**	**—**	**1**	**2**	**3**
COURSE TYPE TOTAL	**9**	**7**	**16**	**15**	**2**	**17**	**—**	**—**	**—**	**24**	**9**	**33**

Masters by Research	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Creative Arts	–	–	–	2	–	2	–	–	–	2	–	2
English	–	2	2	–	5	5	–	–	–	–	5	5
History & Politics	–	–	–	1	–	1	–	–	–	1	–	1
Philosophy	–	–	–	1	1	2	–	–	–	1	1	2
Sociology	–	1	1	–	1	1	–	–	–	–	2	2
STS	–	–	–	1	–	1	–	–	–	1	–	1
Faculty of Arts	**—**	**3**	**3**	**5**	**5**	**10**	**—**	**—**	**—**	**5**	**8**	**13**
Accountancy	–	–	–	–	1	1	–	–	–	–	1	1
Economics	–	–	–	2	–	2	–	–	–	2	–	2
Business Systems	–	–	–	1	–	1	–	–	–	1	–	1
Management	1	0	1	1	–	1	–	–	–	2	–	2
Faculty of Commerce	**1**	**—**	**1**	**4**	**1**	**5**	**—**	**—**	**—**	**5**	**1**	**6**
Learning Studies	–	1	1	2	8	10	–	–	–	2	9	11
Policy and Tech. Studies	–	1	1	2	–	2	–	–	–	2	1	3
Faculty of Education	**—**	**2**	**2**	**4**	**8**	**12**	**—**	**—**	**—**	**4**	**10**	**14**
Civil and Mining Engineering	5	–	5	2	–	2	–	–	–	7	–	7
Materials Engineering	3	2	5	3	1	4	–	–	–	6	3	9
Mechanical Engineering	1	–	1	4	–	4	–	–	–	5	–	5
Faculty of Engineering	**9**	**2**	**11**	**9**	**1**	**10**	**—**	**—**	**—**	**18**	**3**	**21**
Public Health and Nutrition	–	1	1	1	4	5	–	–	–	1	5	6
Human Movement Science	6	1	7	1	3	4	–	–	–	7	4	11
Nursing	–	–	–	1	3	4	–	–	–	1	3	4
Psychology	1	–	1	2	1	3	–	–	–	3	1	4
Faculty Hlth & Behav. Sci.	**7**	**2**	**9**	**5**	**11**	**16**	**—**	**—**	**—**	**12**	**13**	**25**
Computing Science	1	–	1	1	–	1	–	–	–	2	–	2
Elect. & Comp. Engineering	5	1	6	2	1	3	–	–	–	7	2	9
Mathematics	–	–	–	–	–	–	–	–	–	–	–	–
Faculty of Informatics	**6**	**1**	**7**	**3**	**1**	**4**	**—**	**—**	**—**	**9**	**2**	**11**
Biology	–	2	2	–	–	–	–	–	–	–	2	2
Chemistry	–	–	–	1	–	1	–	–	–	1	–	1
Geography	–	–	–	1	1	2	–	–	–	1	1	2
Geology	4	–	4	–	1	1	–	–	–	4	1	5
Faculty of Science	**4**	**2**	**6**	**2**	**2**	**4**	**—**	**—**	**—**	**6**	**4**	**10**
COURSE TYPE TOTAL	**27**	**12**	**39**	**32**	**29**	**61**	**—**	**—**	**—**	**59**	**41**	**100**

Masters by Coursework	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Creative Arts	8	5	13	10	9	19	–	–	–	18	14	32
English	–	2	2	–	–	–	–	–	–	–	2	2
History and Politics	6	2	8	14	1	15	–	–	–	20	3	23
Philosophy	–	–	–	–	–	–	–	–	–	–	–	–
Sociology	1	–	1	4	5	9	–	–	–	5	5	10
STS	1	–	1	4	1	5	–	–	–	5	1	6
Faculty of Arts	**16**	**9**	**25**	**32**	**16**	**48**	**—**	**—**	**—**	**48**	**25**	**73**
Accountancy	16	7	23	6	3	9	–	–	–	22	10	32
Economics	3	1	4	2	1	3	–	–	–	5	2	7
Business Systems	5	2	7	9	3	12	–	–	–	14	5	19
Management	24	8	32	121	29	150	–	–	–	145	37	182
Faculty of Commerce	**48**	**18**	**66**	**138**	**36**	**174**	**—**	**—**	**—**	**186**	**54**	**240**

Masters by Coursework	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Education	2	3	5	21	18	39	–	–	–	23	21	44
Learning Studies	1	2	3	12	23	35	–	–	–	13	25	38
Policy and Tech. Studies	1	1	2	12	5	17	–	–	–	13	6	19
Faculty of Education	**4**	**6**	**10**	**45**	**46**	**91**	**—**	**—**	**—**	**49**	**52**	**101**
Civil and Mining Engineering	–	–	–	4	–	4	–	–	–	4	–	4
Materials Engineering	–	–	–	1	–	1	–	–	–	1	–	1
Mechanical Engineering	2	–	2	6	–	6	–	–	–	8	–	8
Faculty of Engineering	**2**	**—**	**2**	**11**	**—**	**11**	**—**	**—**	**—**	**13**	**—**	**13**
Public Health and Nutrition	2	9	11	6	12	18	–	–	–	8	21	29
Psychology	–	1	1	7	3	10	–	–	–	7	4	11
Faculty Hlth & Behav. Sci.	**2**	**10**	**12**	**13**	**15**	**28**	**—**	**—**	**—**	**15**	**25**	**40**
Computing Science	–	–	–	5	–	5	–	–	–	5	–	5
Mathematics	1	–	1	1	1	2	–	–	–	2	1	3
Faculty of Informatics	**1**	**—**	**1**	**6**	**1**	**7**	**—**	**—**	**—**	**7**	**1**	**8**
Chemistry	4	1	5	–	–	–	–	–	–	4	1	5
Geography	–	–	–	1	1	2	–	–	–	1	1	2
Geology	–	–	–	3	2	5	–	–	–	3	2	5
Faculty of Science	**4**	**1**	**5**	**4**	**3**	**7**	**—**	**—**	**—**	**8**	**4**	**12**
COURSE TYPE TOTAL	**77**	**44**	**121**	**249**	**117**	**366**	**—**	**—**	**—**	**326**	**161**	**487**

Masters—Preliminary	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Creative Arts	–	–	–	–	1	1	–	–	–	–	1	1
English	–	–	–	–	2	2	–	–	–	–	2	2
Sociology	–	–	–	1	–	1	–	–	–	1	–	1
STS	1	–	1	4	2	6	–	–	–	5	2	7
Faculty of Arts	1	—	1	5	5	10	—	—	—	6	5	11

Accountancy	2	–	2	4	3	7	–	–	–	6	3	9
Economics	8	1	9	7	–	7	–	–	–	15	1	16
Management	–	1	1	3	–	3	–	–	–	3	1	4
Faculty of Commerce	**10**	**2**	**12**	**14**	**3**	**17**	**—**	**—**	**—**	**24**	**5**	**29**
Education	–	–	–	1	5	6	–	–	–	1	5	6
Learning Studies	–	–	–	1	1	2	–	–	–	1	1	2
Policy and Tech. Studies	–	–	–	1	–	1	–	–	–	1	–	1
Faculty of Education	**—**	**—**	**—**	**3**	**6**	**9**	**—**	**—**	**—**	**3**	**6**	**9**
Public Health and Nutrition	–	4	4	–	6	6	–	–	–	–	10	10
Human Movement Science	2	2	4	4	1	5	–	–	–	6	3	9
Nursing	–	–	–	–	1	1	–	–	–	–	1	1
Psychology	1	2	3	4	8	12	–	–	–	5	10	15
Faculty Hlth & Behav. Sci.	**3**	**8**	**11**	**8**	**16**	**24**	**—**	**—**	**—**	**11**	**24**	**35**
Civil and Mining Engineering	1	–	1	1	–	1	–	–	–	2	–	2
Mechanical Engineering	1	–	1	–	–	–	–	–	–	1	–	1
Faculty of Engineering	**2**	**—**	**2**	**1**	**—**	**1**	**—**	**—**	**—**	**3**	**—**	**3**
Computing Science	–	–	–	4	–	4	–	–	–	4	–	4
Faculty of Informatics	**—**	**—**	**—**	**4**	**—**	**4**	**—**	**—**	**—**	**4**	**—**	**4**

Masters—Preliminary	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Biology	2	–	2	4	1	5	–	–	–	6	1	7
Chemistry	–	–	–	–	1	1	–	–	–	–	1	1
Geography	–	–	–	1	–	1	–	–	–	1	–	1
Geology	5	1	6	7	–	7	–	–	–	12	1	13
Physics	1	–	1	1	1	2	–	–	–	2	1	3
Faculty of Science	**8**	**1**	**9**	**13**	**3**	**16**	**—**	**—**	**—**	**21**	**4**	**25**
COURSE TYPE TOTAL	**24**	**11**	**35**	**48**	**33**	**81**	**—**	**—**	**—**	**72**	**44**	**116**

Postgraduate Diploma	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Languages	–	–	–	1	5	6	–	–	–	1	5	6
Sociology	–	2	2	–	–	–	–	–	–	–	2	2
STS	–	–	–	1	–	1	–	–	–	1	–	1
Faculty of Arts	**—**	**2**	**2**	**2**	**5**	**7**	**—**	**—**	**—**	**2**	**7**	**9**
Accountancy	3	3	6	4	2	6	–	–	–	7	5	12
Economics	1	–	1	1	–	1	–	–	–	2	–	2
Information Systems	4	1	5	10	3	13	–	–	–	14	4	18
Management	6	3	9	56	20	76	–	–	–	62	23	85
Faculty of Commerce	**14**	**7**	**21**	**71**	**25**	**96**	**—**	**—**	**—**	**85**	**32**	**117**
Education	22	38	60	1	6	7	14	51	65	37	95	132
Faculty of Education	**22**	**38**	**60**	**1**	**6**	**7**	**14**	**51**	**65**	**37**	**95**	**132**

Public Health and Nutrition	–	1	1	–	20	20	–	–	–	–	21	21
Psychology	1	3	4	5	10	15	–	–	–	6	13	19
Faculty Hlth & Behav. Sci.	**1**	**4**	**5**	**5**	**30**	**35**	**—**	**—**	**—**	**6**	**34**	**40**
Computing Science	3	1	4	8	1	9	–	–	–	11	2	13
Mathematics	1	–	1	–	–	–	–	–	–	1	–	1
Faculty of Informatics	**4**	**1**	**5**	**8**	**1**	**9**	**—**	**—**	**—**	**12**	**2**	**14**
Geography	1	–	1	–	–	–	–	–	–	1	–	1
Faculty of Science	**1**	**—**	**1**	**—**	**—**	**—**	**—**	**—**	**—**	**1**	**—**	**1**
Legal Studies	2	1	3	5	8	13	–	–	–	7	9	16
Faculty of Law	**2**	**1**	**3**	**5**	**8**	**13**	**—**	**—**	**—**	**7**	**9**	**16**
COURSE TYPE TOTAL	**44**	**53**	**97**	**92**	**75**	**167**	**14**	**51**	**65**	**150**	**179**	**329**

Bachelor Degree	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
BA	298	516	814	162	277	439	–	–	–	460	793	1253
BA(Hons)	18	20	38	9	13	22	–	–	–	27	33	60
BCA	69	128	197	1	25	26	–	–	–	70	153	223
BCA(Hons)	1	5	6	–	1	1	–	–	–	1	6	7
Faculty of Arts	**386**	**669**	**1055**	**172**	**316**	**488**	**—**	**—**	**—**	**558**	**985**	**1543**
BCom	600	471	1071	238	158	396	–	–	–	838	629	1467
BCom(Hons)	4	1	5	1	–	1	–	–	–	5	1	6
Faculty of Commerce	**604**	**472**	**1076**	**239**	**158**	**397**	**—**	**—**	**—**	**843**	**630**	**1473**

Bachelor Degree	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
BEd-Phy/HlthEd	77	69	146	5	1	6	–	–	–	82	70	152
BEd(Hons)-Phy/HlthEd	2	2	4	–	–	–	–	–	–	2	2	4
BEd-Phy/HlthEd-Conversion	–	–	–	–	–	–	2	2	4	2	2	4
BEd(Primary)	7	31	38	–	–	–	–	–	–	7	318	38
BEd(Primary)-Conversion	–	–	–	–	–	–	60	230	290	60	230	290
BEd(Prim)-Diploma	68	244	312	9	23	32	–	–	–	77	267	344
BEd(Primary) (Honours)	–	2	2	–	–	–	–	–	–	–	2	2
BEd(Secondary)-Eng/Hist	29	36	65	3	5	8	–	–	–	32	41	73
BEd(Secondary)-Math	15	17	32	1	–	1	–	–	–	16	17	33
BEd(Secondary)-Science	6	3	9	–	1	1	–	–	–	6	4	10
Faculty of Education	**204**	**404**	**608**	**18**	**30**	**48**	**62**	**232**	**294**	**284**	**666**	**950**
BE-Civil	171	14	185	76	5	81	–	–	–	247	19	266
BE-Civil/Mining	4	–	4	1	–	1	–	–	–	5	–	5
BE-Computer	83	5	88	47	2	49	–	–	–	130	7	137
BE-Electrical	177	10	187	102	13	115	–	–	–	279	23	302
BE-Materials	42	10	52	38	7	45	–	–	–	80	17	97
BE-Mechanical	130	4	134	143	4	147	–	–	–	273	8	281
BE-Mining	18	–	18	19	–	19	–	–	–	37	–	37
BE/BCom	3	–	3	–	–	–	–	–	–	3	–	3
Faculty of Engineering	**628**	**43**	**671**	**426**	**31**	**457**	**—**	**—**	**—**	**1054**	**74**	**1128**

BAppSci-Human Movement	61	53	114	7	10	17	–	–	–	68	63	131
BAppSci(Hons)-Human Move.	–	–	–	–	–	–	–	–	–	–	–	–
BNursing-Conversion	–	27	27	4	44	48	–	–	–	4	71	75
Faculty Hlth & Behav. Sci.	**61**	**80**	**141**	**11**	**54**	**65**	**—**	**—**	**—**	**72**	**134**	**206**
BMath/BE	6	–	6	1	1	2	–	–	–	7	1	8
BMath-Computing	163	39	202	155	33	188	–	–	–	318	72	390
BMaths(Hons)-Computing	1	–	1	–	–	–	–	–	–	1	–	1
BMath-Mathematics	40	28	68	31	18	49	–	–	–	71	46	117
BMath(Hons)	–	1	1	–	–	–	–	–	–	–	1	1
BInfoTechCom	75	50	125	25	10	35	–	–	–	100	60	160
Faculty of Informatics	**285**	**118**	**403**	**212**	**62**	**274**	**—**	**—**	**—**	**497**	**180**	**677**
BBiotech	1	2	3	–	–	–	–	–	–	1	2	3
BEnvSci	55	38	93	25	3	28	–	–	–	80	41	121
BEnvSci(Hons)	2	1	3	1	1	2	–	–	–	3	2	5
BSc/BE	1	–	1	–	–	–	–	–	–	1	–	1
BSc	204	145	349	75	61	136	–	–	–	279	206	485
BSc(Hons)	5	5	10	5	5	10	–	–	–	10	10	20
BSc-Nutrition	2	16	18	–	3	3	–	–	–	2	19	21
Faculty of Science	**270**	**207**	**477**	**106**	**73**	**179**	**—**	**—**	**—**	**376**	**280**	**656**
COURSE TYPE TOTAL	**2438**	**1993**	**4431**	**1184**	**724**	**1908**	**62**	**232**	**294**	**3684**	**2949**	**6633**

Enabling	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
BEd(Primary)-Bridging	–	–	–	–	–	–	13	33	46	13	33	46
Faculty of Education	**—**	**—**	**—**	**—**	**—**	**—**	**13**	**33**	**46**	**13**	**33**	**46**
COURSE TYPE TOTAL	**—**	**—**	**—**	**—**	**—**	**—**	**13**	**33**	**46**	**13**	**33**	**46**

Diploma	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
DipTeach(Primary)-Conversion	–	–	–	–	–	–	5	49	54	5	49	54
Faculty of Education	**—**	**—**	**—**	**—**	**—**	**—**	**5**	**49**	**54**	**5**	**49**	**54**
DipAppSci(Nursing)	49	284	333	13	19	32	–	–	–	62	303	365
DipAppSci(Nursing)-Conversion	–	8	8	2	36	38	–	–	–	2	44	46
Faculty of Science	**49**	**292**	**341**	**15**	**55**	**70**	**—**	**—**	**—**	**64**	**347**	**411**
COURSE TYPE TOTAL	**49**	**292**	**341**	**15**	**55**	**70**	**5**	**49**	**54**	**69**	**396**	**465**

Associate Diploma	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
AssocDipCompApplicns	63	37	100	60	25	85	–	–	–	123	60	183
AssocDipAdmin(CompApplic)	–	–	–	1	1	2	–	–	–	1	1	2
AssocDipAdmin(Industrial)	3	–	3	29	17	46	–	–	–	32	17	49
AssocDipAdmin(SmlBusMgt)	–	1	1	2	1	3	–	–	–	2	2	4
Faculty of Commerce	**66**	**38**	**104**	**92**	**42**	**134**	**—**	**—**	**—**	**158**	**80**	**238**

AssocDipSportsSc	—	—	—	3	4	7	—	—	—	3	4	7
Faculty of Science	—	—	—	3	4	7	—	—	—	3	4	7
COURSE TYPE TOTAL	66	38	104	95	46	141	—	—	—	161	84	245

Non-Award	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Non-Award	—	—	—	20	20	40	—	—	—	20	20	40
Non-Award (Full Fee)	—	—	—	2	2	4	—	—	—	2	2	4
Non-Award (Exchange)	5	7	12	2	8	10	—	—	—	7	15	22
Non-Award (Study Abroad)	4	3	7	8	11	19	—	—	—	12	14	26
COURSE TYPE TOTAL	9	10	19	32	41	73	—	—	—	41	51	92

Total University Enrolments	Full-Time			Part-Time			External			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
	2850	2498	5348	1834	1156	2990	94	365	459	4778	4019	8797

ACADEMIC PROMOTIONS

Name	Promoted to	Academic Unit
Dr E A Bryant	Associate Professor	Geography
Mr R G Castle	Associate Professor	Economics
Dr G Delamore	Associate Professor	Materials Engineering
Dr E Richards	Associate Professor	Science andTechnology Studies
Dr P Shepherd	Associate Professor	Creative Arts
Dr E J Steele	Associate Professor	Biology
Dr A K Tieu	Associate Professor	Mechanical Engineering
Dr R J Whelan	Associate Professor	Biology
Ms R Albury	Senior Lecturer	Sociology
Dr J Chicharo	Senior Lecturer	Electrical & Computer Engineering
Ms B Derewianka	Senior Lecturer	Education
Dr M Donaldson	Senior Lecturer	Sociology
Dr C Fergusson	Senior Lecturer	Geology
Mr J Fulcher	Senior Lecturer	Computer Science
Dr R Kohoutek	Senior Lecturer	Civil & Mining Engineering
Mrs T A McDonald	Senior Lecturer	Nursing
Ms A O'Neill	Senior Lecturer	Geography
Dr D Platt	Senior Lecturer	Electrical & Computer Engineering
Dr R Sparks	Senior Lecturer	Mathematics
Ms S Uniacke	Senior Lecturer	Philosophy
Dr H Winchester	Senior Lecturer	Geography
Dr C D Woodroffe	Senior Lecturer	Geography
Dr P W Wypych	Senior Lecturer	Mechanical Engineering

STUDY AND OVERSEAS CONFERENCE LEAVE IN EXCESS OF TWO WEEKS

Faculty/Unit	Member	Principal Location
FACULTY OF ARTS		
Creative Arts	Prof B Conyngham	USA, UK
	Mr L J Duncan	France, Italy, Switzerland, Germany, UK, USA
	Mr A J Ford	Australia
	Ms L J Scott-Murphy	USSR
	Dr P L Shepherd	France, Italy, UK, USA
	Mr L Tan	USA, France
English	Dr A Cranny-Francis	Australia
	Dr R Harland	UK, Australia
	Mr R McConchie	USA, Finland
	A Prof J M Wieland	Australia
History & Politics	A Prof C Kiernan	UK, Ireland, Australia
	Dr A D Wells	UK, Netherlands, USSR
Modern Languages	Mr H A Jeanjean	France
Philosophy	Dr D I Simpson	Australia
Science & Technology Studies	Prof J E Falk	USA, Australia
	Dr E Richards	UK, Australia
Sociology	Prof S C Hill	Spain, Thailand, China, Korea, Malaysia, Europe, New Zealand, USA, Australia
	Ms S Short	Ghana, UK, USA, Canada, Australia
FACULTY OF COMMERCE		
Accountancy	Mr R P Shannon	UK
	A Prof H Y Teoh	Hong Kong, China, Korea, Singapore, Malaysia, Australia
Economics	Mr R G Castle	Holland, UK, Germany
	Dr C Harvie	USA, Canada, UK
	Prof D A S Jackson	UK, Australia

Faculty/Unit	Member	Principal Location
Management	Mr A J Naughton	UK
	Dr A B Sim	Singapore, Malaysia
	Dr T A Williams	UK
FACULTY OF EDUCATION		
Learning Studies	A Prof B L Cambourne	USA
	Ms J Turbill	USA
	A Prof P de Lacey	USA, Guam, Japan
	Ms B M Derewianka	UK, Italy, Greece, Canada
	A Prof N J Kyle	UK, Australia
	Mr W Winser	Greece, UK
Policy & Technology Studies	Ms A S Elliott	Japan, UK
	Ms S A Rice	UK, Australia
FACULTY OF ENGINEERING		
Civil & Mining Engineering	Dr R Arenicz	Brazil, Peru
	Dr N I Aziz	Italy, USA, Australia
	Dr E Y Baafi	USA, Ghana, Germany, Australia
	Dr M J Boyd	Australia
	Dr M Sivakumar	India, Japan, Australia
Mechanical Engineering	Prof P C Arnold	UK, Japan, Czechoslavakia
	Dr P R Gibson	UK
	Dr G J Montagner	Australia
	Dr A K Tieu	UK, USA, France, Canada, Australia
Material Engineering	Prof W J Plumbridge	USA, Hawaii, UK
	Prof N Standish	USA
FACULTY OF HEALTH AND BEHAVIOURAL SCIENCES		
Nursing	Mrs F M S Campbell	UK
	Ms M L Gerry	Australia
	Mrs R Griffiths	Denmark, West Germany, UK
	Mr W Janes	France, UK
	A Prof B M Partridge	Holland
Psychology	Dr N I Mackay	UK
	Dr D L Mixon	USA, Australia
	Dr S Srinivasan	UK, Ireland, India
FACULTY OF INFORMATICS		
Computer Science	Dr P R Nickolas	Australia
Mathematics	Dr S Ghahreman	Australia
	Prof D A Griffiths	Hong Kong, USA, UK, New Zealand, Australia
	Prof J M Hill	Australia
	Dr T S Horner	UK, Czechoslavakia, Japan, Europe
	Dr F P Prokop	Australia
	Dr R Sparks	Australia
FACULTY OF LAW		
	Mr J Nothdurft	Australia
	Dr R C Williams	South Africa
FACULTY OF SCIENCE		
Biology	Dr D J Ayre	USA, Australia
	A Prof R McC Lilley	USA
	Dr E J Steele	Australia
Chemistry	Prof L Kane-Maguire	UK, USA, Hong Kong, Australia
	Dr M J Garson	USA
Geography	Dr E A Bryant	Australia
	Prof M G A Wilson	Ireland
Geology	Dr P F Carr	USA
Physics	G K G Moore	USA
	Dr P E Simmonds	UK

PRIZES AWARDED

Name of Prize Winner	Name of Prize
Faculty of Arts	
English	
Joanne Roddis	The Marjory Brown Prize
Creative Arts	
Not determined	Des Davis Prize in Drama
Kirk Hawksworth	Philip Larkin Prize
History and Politics	
Not determined	The Australian Institute of Political Science Prize
Kathy Banks	Jabinda Prize
Not determined	Australian Institute of International Affairs
Joint Award:	
Julie Crooke Gai Warner	Mary Wade Prize for Australian History
Faculty of Commerce	
Accountancy	
Gavin Michael O'Farrell	Australian Society of Certified Practising Accountants Annual Prize (1)
Kwok Wai Calvin Lam	Australian Society of Certified Practising Accountants Annual Prize (2)
George Shahinian	Australian Society of Certified Practising Accountants Annual Prize (3)
Chui Yi Tracy Tam	ATMA Prize for Management – Accountancy
Catherine Mary McCahon	Coopers and Lybrand Prize for Advanced Auditing
Kla Lee	KPMG Peat Marwick Chartered Accountants Prize for Business Finance I
Chui Yi Tracy Tam	NSW Department of Finance Prize
Peter John Middleton	Orestis Trikas Prize for Accountancy and Management
Business Systems	
insiah Bourke	Apple Award for Computer Applications
Linda O'Loughlin	Unisys Award for Business Systems Analysis
Peter Hyland	Unisys Award for Graduate Diploma in Business Information Systems
Economics	
John Perera	The Hilda Kirby Prize
Not awarded in 1990	The Eric Derra Young Industrial Relations Prize
Management	
Prize to be determined	The AIM Diploma in Management Prize
Prize to be determined	The AIM Master of Business Administration Prize
Prize to be determined	The AIM Prize in Management Studies
Chui Yi Tracy Tam	Friends Prize for Management Studies
John Peter Henderson	National Safety Council of Australia Prize
Faculty of Engineering	
Civil Engineering	
Not determined	
Materials Engineering	
Jari Petter Hyvarinen	The Australian Institute of Mining and Metallurgy (Illawarra Branch) Mining Prize
David John Langley	BHP Colorbond Materials Prize
M Funcik	BHP Steel Slab and Plate Products Division Materials Prize
Bryan Andrew Sheddon	Blue Circle Southern Cement Limited Maldon Works Materials Prize
Risman Robin Cornelius	Commonwealth Banking Corporation Materials Prize
Risman Robin Cornelius	Institute of Metals & Materials Australasia (Wollongong Branch) Materials Prize
1. Bryan Andrew Shedden 2. Leonard Keith Woods 3. Leonard Keith Woods	Metal Manufactures Prizes (three prizes)
Mechanical Engineering	
Ahmad Faiz Abdul Hamid	Sam Marshall Prize for Mechanical Engineering Undergraduate Thesis
Mining Engineering	
Gerald Linde	Australian Institute of Mining and Metallurgy Prize

Lip Hen Teh	
Charles Richard Goldsmith	Joint Coal Board Prizes
Gerald Linde	
Scott Alexander Graham	Elizabeth Tague Prize
Gerald Linde	Western Mining Prize (Best Thesis)
Gerald Linde	Western Mining Prize (Best Academic Record)

Faculty of Health and Behavioural Sciences

Nursing

Kirsty Joanne Todd	The Illawarra Hospital Prize for Nursing
Megan Louise O'Dea	The Illawarra Hospital Encouragement Award
Kirsty Joanne Todd	The Illawarra Award for Nursing Excellence

Psychology

Robyn Hill	The Australian Psychological Society Prize in Psychology

Faculty of Informatics

Computer Science

Graham Anthony Heathcote	IBM Prize for Excellence in Computer Science

Electrical and Computer Engineering

Jason Colin Zarew	A.W. Tyree Transformers Pty Limited Award
Peter Anthony Langdon	Institution of Electrical Engineers Award
Tony Liu	Institution of Electrical Engineers, UK, Award
David John Atkinson	Staff Prize for Final Year Electrical Engineering Thesis

Mathematics

Catherine O'Rourke	The Austin Keane Memorial Prize
Aaron Avaglions)	The SA Senior Prize
Carolyn Scarratt)	
Cathrein Leah Chapman	Statistical Society of Australia (NSW Branch) Prize

Faculty of Law

Peter Middleton)	Butterworths Pty Ltd Law Publishers
Angus Ross)	
Carolyn Irvine)	
Alexander Hudson)	
Andrew Wood	Corporate Affairs Commission
Catherine Carlisle	Australian Association of Tax & Management Accountants Ltd

Faculty of Science

Science

Sharon Louise Epps	The Gina Savage Prize

Biology

Peter Keith Fagan	The Biology Prize

Chemistry

Not awarded in 1990	Bert Halpern Prize in Chemistry
Monica Manthey	The G.W. Daniels Memorial Prize
Wayne Ible)	The Peter Beckmann Memorial Prize
Eugene Richard Le Breton)	

Geology

Russell Laird Chown	The A J & I. Waters Prize in Geology
Allison Robyn Cram	The Australasian Institute of Mining & Metallurgy (Illawarra Branch) Geology Prize
Michael Ceccato	The CRAE Mapping Prize in Geology
Stuart Clifford Tye	The CRAE Orde Deposits Prize
Russell Laird Chown	The Evan Phillips Prize in Geology
David Andrew Gregory	The Foundation Prize in Geology
Rodney Campbell Feldtmann	The Geological Society of Australia (NSW Division) Prize in Geology
Andrew Geoffrey Penkethman	Ian R McDonald Prize in Geology
Allison Robyn Cram	The Prospectors Supplies Pty Ltd Prize in Geology

Physics

Peter John Maguire	The Australian Institute of Physics (NSW Branch) Prize in Physics
Duncan James Fisher	Staff Prize in First Year Physics
Not awarded in 1990	Staff Prize in Second Year Physics
Peter John Maguire	Staff Prize in Third Year Physics
Not awarded in 1990	Staff Prize in Honours Year Physics

Financial Statements

Finance Report

The Financial Statements of the University for the year ended 31 December 1990 have been prepared in accordance with the provisions of the Public Finance and Audit Act 1983, and the Public Finance and Audit (Statutory Bodies) Regulation 1985 and certified by the Auditor General in terms of Section 41C of that Act.

The form and content of the statements are largely dictated by the requirements of the Public Finance and Audit Act 1983. The University currently receives exemption under the Act for the preparation of consolidated accounts. Consequently the University's financial statements show the results and transactions for University activities only and do not include the results and transactions of its subsidiary companies. Separate financial statements are prepared for each subsidiary and the results thereof are also reported by way of a note to the University's accounts.

Accrual Accounting

In 1990, the University's accounts have, for the first time, been prepared on an accrual basis. Prior to 1990, the accounts were prepared on a 'modified' accrual basis which was approved by the Treasurer under the terms of the Public Finance and Audit Act 1983. The principal effects of this significant change in accounting policy are:

- Property, plant and equipment are treated as capital items instead of being treated as operating expenditure in the year of acquisition.
- Except for land and works of art, the above assets are depreciated over their estimated useful life. Land and works of art are not depreciated as these are expected to appreciate in value.
- The full amount of the expense and liability in respect of employees' superannuation, annual leave and long-service leave entitlements is brought to account.
- Unexpended research grants are treated as grants received in advance.

Where possible, property, plant and equipment acquired by the University are valued at acquisition cost. Where records are unavailable these assets have been brought to account at valuation and adjusted for accumulated depreciation.

Valuations adopted are as follows:

Land	–	Last available Valuer General's valuation as shown on the summary of land accompanying the Financial Statements.
Buildings	–	Insurance replacement value assessed by independent valuer as at 31 December 1990.

The most significant of the above changes is the capitalisation of property, plant and equipment valued at $135 million. The inclusion of this figure in the balance sheet not only highlights the 'true' state of the University's financial affairs, but also assists in the planning of additions, replacements and maintenance of capital items.

Format

The reporting format used by the University in disclosing its financial affairs has also been significantly changed. The University no longer provides individual statements of expenditure by fund source. Expenditure is reported by line items in lieu of fund accounting and all capital items and internal transfers have been eliminated.

A separate schedule of income and expenditure by funds source has been included to reconcile the results shown in the Financial Statements with the results to be reported to the granting bodies.

It should be noted that the combined income and expenditure statement combines a number of funds which, under granting conditions, can only be utilized for specified expenditure purposes.

The change in accounting policies and presentation in 1990 is of such significance that it is not practicable to compare the majority of 1990 figures with those of the previous year. However the following conclusions can be made in relation to income.

Total income available to the University and its subsidiaries in 1990 was $97.1 million. Of that 61 per cent was received from the Commonwealth and State Governments, and student charges, for recurrent teaching and research activities (1989, 68 per cent).

Increases in income were achieved for all sectors of the University, as shown in Table 1. The most significant increase occurred in international student funds which more than doubled in amount as the programme continued its expansion. Infrastructure changes in the University's International Office designed to improve response times, combined with the growing reputation of the University overseas, have contributed to this success.

The increase in student residence income reflects the additional 314 student places created in 1990 through extensions at Koolobong and Weerona and refurbishment of accommodation at Campus East previously occupied by the Illawarra Housing Trust. At the end of 1990, the total stock of student accommodation was approximately 850 places.

Despite falling interest rates, the University's total investment income was higher than in 1989. This resulted from an increase in the amount of funds available for investment combined with increased activity in the fixed interest market through investment with the New South Wales Treasury Corporation's Hourglass facility. As in 1989, the heavy and persistent rain experienced in the first half of 1990 contributed to the results achieved as construction and capital expenditure were delayed pending an improvement in the weather.

Major building projects undertaken during the year included the continued construction of the general purpose academic building; the completion of the swimming pool, Stage 2 of the Illawarra Technology Centre and additions to student accommodation and facilities at Weerona, Koolobong and Campus East; and the commencement of Stage 3 of the Technology Centre and the Science academic building. The academic buildings are being funded by Commonwealth Government grants. The other projects have been funded in varying amounts from bank loans and University development funds which are derived mainly from investment income.

Table1: Comparison of Income

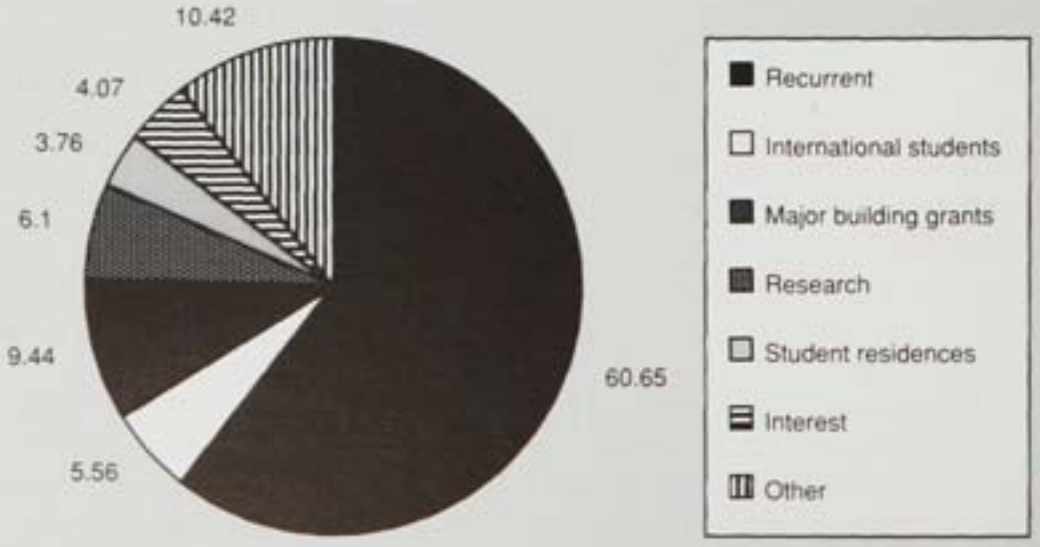
	1990 $000	1989 $000	% Increase
Recurrent	58,906	53,669	9.8
International students	5,402	2,628	105.6
Major building grants	9,169	4,000	129.2
Research	5,925	5,372	*
Student residences	3,649	2,199	65.9
Interest	3,950	3,155	25.2
Other	10,117	9,804	*
	97,118	80,827	*

* As a result of the change in accounting policy, these figures cannot be compared.

Income from subsidiary companies (excluding Friends) is for the financial year ending June 1990.

Figure 1: Income received 1990

(percentages)



University of Wollongong

FINANCIAL STATEMENTS
31 DECEMBER 1990

AUDITOR GENERAL'S CERTIFICATE

The accounts of the University of Wollongong for the year ended 31 December 1990 have been audited in accordance with Section 34 of the Public Finance and Audit Act 1983.

In my opinion, the accompanying balance sheet, together with the combined statement of income and expenditure and funds statement, read in conjunction with the notes thereto, comply with Section 41B of the Act and exhibit a true and fair view of the financial position at 31 December 1990, and transactions for the year then ended.

SYDNEY
22 April 1991

R K DUNN, FCPA
ASSISTANT AUDITOR-GENERAL

STATEMENT BY MEMBERS OF THE COUNCIL

Pursuant to Section 41B(1)(f) of the Public Finance and Audit Act, 1983, and in accordance with a resolution of the members of the Council, we declare on behalf of the Council of the University of Wollongong that, subject to audit requirements, in our opinion:

1. The accompanying financial statements exhibit a true and fair view of the financial position of the University of Wollongong as at 31 December 1990 and transactions for the year then ended.

2. The statements have been prepared in accordance with the provisions of the Public Finance and Audit Act, 1983, and the Public Finance and Audit (Statutory Bodies) Regulation, 1985.

Further, we are not aware of any circumstances which would render any particulars included in the financial statements to be misleading or inaccurate.

Vice-Chancellor

Deputy Chancellor

8 February 1991

BALANCE SHEET AS AT 31 DECEMBER 1990

1989 $		Note	1990 $
	Current Assets	3	
364,260	Cash		–
4,245,904	Receivables		5,099,273
13,560,753	Investments	6	18,551,857
80,799	Inventories	1(d)(ii)	352,723
196,427	Other		542,639
18,448,143	TOTAL CURRENT ASSETS		24,546,492
	Non-current Assets	4	
–	Property, plant and equipment	1(d)(iii)	136,169,440
27,687,375	Receivables		29,978,979
5,549,716	Investments	6	7,120,817
33,237,091	TOTAL NON-CURRENT ASSETS		173,269,236
51,685,234	**TOTAL ASSETS**		197,815,728
	Current Liabilities	7	
4,376,439	Creditors and borrowings		4,059,051
192,083	Provisions		4,805,480
453,026	Special funds		928,338
9,317,326	Other		27,372,722
–	Trust funds	16	2,598
14,338,874	TOTAL CURRENT LIABILITIES		37,168,189
	Non-current Liabilities		
1,042,839	Creditors and borrowings	8	4,208,692
3,871,045	Provision for long-service leave	10(ii)	5,093,795
26,817,129	Provision for State superannuation	10(iii)	28,130,764
778,292	Provision for State Public Service superannuation	10(iv)	–
1,755,984	Professorial Superannuation Scheme	10(i)	4,086,200
–	Trust funds	16	568,127
34,265,289	TOTAL NON-CURRENT LIABILITIES		42,087,578
48,604,163	**TOTAL LIABILITIES**		79,255,767
$3,081,071	**NET ASSETS**		$118,559,961
	RETAINED EARNINGS	12	
3,081,071	Accumulated funds		3,062,537
–	Asset revaluation reserve	11	115,332,424
–	Loan repayment reserve	11	165,000
$3,081,071	**TOTAL RETAINED EARNINGS**		$118,559,961

The Balance Sheet is to be read in conjunction with the Notes to and forming part of the accounts on pages 109 to 118.

COMBINED STATEMENT OF INCOME AND EXPENDITURE
FOR THE YEAR ENDED 31 DECEMBER 1990

1989 $		Note	1990 $
	Income		
	Commonwealth Government grants		
49,238,700	Recurrent	21	53,751,000
609,286	Productivity superannuation supplementation	23	–
2,794,899	Research		3,578,335
4,000,000	Capital works		–
417,064	Other		896,347
	State Government grants		
31,241	Conservatorium of Music		83,000
2,286,336	Nurse education		2,738,312
177,795	Research		93,035
74,024	Other		152,827
–	Deferred income due from Commonwealth/State Government for superannuation liability	22	2,312,343
875,284	Other grants and donations for research		91,233
264,272	Scholarships and prizes		300,457
5,742,676	Special purpose accounts		7,047,812
2,628,091	International student operations		5,951,169
1,064,311	Higher Education Contribution Scheme	20	1,218,843
2,198,882	Student residences		3,648,792
3,155,204	Interest		3,949,674
438,792	Other income		675,725
–	Deferred grants	1(i)	135,019
75,996,857	Total income		86,623,923
	Expenditure		
–	Audit fees	13	45,000
–	Bad debts		33,688
–	Consumables		12,350,295
–	Depreciation		5,504,613
–	Interest paid	14	845,168
–	Library		1,651,383
–	Repairs and maintenance		885,719
–	Salaries and related costs		44,010,735
3,767,926	Superannuation in service costs		4,414,625
–	Travel		1,553,358
–	Overheads		4,704,597
–	Other		183,846
	Recurrent		
26,749,407	Academic activities		–
4,723,098	Academic services		–
903,683	Student services		–
12,434,387	General university services		–
774,456	Public services		–
	Financial transfers for:	1(k)	
2,450,385	Equipment		3,304,280
691,000	Minor works		891,643
208,762	Equipment grant purchases		–
3,930,013	Research		–
2,495,222	Major building works		–

continued overleaf

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1989 $		Note	1990 $	
511,493	Scholarships and prizes		1,471,713	
7,171,222	Special purpose accounts		–	
1,374,456	Full-fee courses		–	
2,387,454	Student residences		–	
3,583,494	Student residences – building projects		–	
9,500	Provision for doubtful debts		1,600	
464,602	Provision for long-service leave		495,248	
35,000	Provision for major repairs and replacements		75,000	
75,375	Provision for Professorial Superannuation Scheme		67,270	
	Abnormal Item:			
–	Provision for annual leave	10(v)	2,153,375	
74,740,935	Total expenditure		84,643,156	
1,255,922	Surplus for year prior to adjustments		1,980,767	
725,767	Less interest transferred to provisions		998,988	
530,155	Surplus		981,779	
53,465 Dr	Add prior period adjustment		176,636	
476,690	Surplus		1,158,415	
	Add – Deferred income due from Commonwealth/ State Governments			
1,938,908	for superannuation liability		–	
2,415,598			1,158,415	
	Less increase in employees' accrued entitlements for superannuation.			
1,747,432	State superannuation	10(iii)	2,312,343	
191,476	State Public Service superannuation	10(iv)	–	
1,938,908			2,312,343	
476,690 Cr	Deficit for year after adjustments	19	1,153,928	
2,604,381	Add accumulated funds at 1 January 1990	12(i)	855,403	Dr
3,081,071			2,009,331	Dr
	Add transfers from reserves			
–	Asset revaluation reserve		5,236,868	
3,081,071			3,227,537	
	Less transfers to reserves			
–	Loan repayment reserve		165,000	
$3,081,071	Accumulated funds at 31 December 1990		$3,062,537	

The Combined Statement of Income and Expenditure is to be read in conjunction with the Notes to and forming part of the accounts on pages 109 to 118.

STATEMENT OF SOURCES AND APPLICATION OF FUNDS FOR THE YEAR ENDED 31 DECEMBER 1990

1989 $		1990 $
	Sources of Funds	
	Funds from operations (A)	
	Inflows of funds from operations	
59,629,345	Commonwealth and State Government Grants	63,605,199
5,891,284	Student fees	10,818,804
10,516,568	Other	12,484,495
76,037,197	Total inflows	86,908,498
71,068,538	Less outflows of funds from operations	72,122,741
4,968,659		14,785,757
1,938,908	Deferred income	–
6,907,567		14,785,757
	Reduction in assets	
	Current assets	
–	Accrued income	1,191,314
–	Cash	364,260
288,475	Sundry advances	–
31,542	Stock	–
320,017		1,555,574
	Non–current assets	
2,036	Loans to staff	20,739
450,000	Investments	–
452,036		20,739
	Increase in liabilities	
	Current liabilities	
–	Cash book balance	1,199,724
1,189,313	Creditors and accrued expenses	–
7,790,320	Income received in advance	5,003,463
–	Deferred income	10,551,933
8,979,633		16,755,120
	Non–current liabilities	
25,668	Secured loans	3,165,853
25,668		3,165,853
$16,684,921	Total sources of funds	$36,283,043
	Application of Funds	
	Increase in assets	
	Current assets	
830	Cash on hand	–
8,671,124	Investments	4,991,104
797,634	Debtors	1,850,950
120,881	Prepayments	346,212
453,151	Accrued income	–
–	Sundry advances	195,333
–	Stock	271,924
342,900	Cash at bank	–
10,386,520		7,655,523

continued overleaf

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1989 $		1990 $
	Non–current assets	
–	Investments	1,571,101
1,938,908	Amount owing by Commonwealth/State Governments	2,312,343
–	Property, plant and equipment	18,609,271
1,938,908		22,492,715
	Reduction in liabilities	
	Current liabilities	
–	Unsecured advance	150,000
28,611	Bank overdraft	–
363,117	Secured loans	86,561
–	Creditors and accrued expenses	1,280,551
391,728		1,517,112
	Non–current liabilities	
150,000	Unsecured advance	–
150,000		–
640,183	Long–service leave paid	607,805
469,771	Professorial superannuation benefits and refund contributions paid	98,561
19,452	Major repairs and replacements paid	137,978
527,000	Minor works paid	624,025
2,161,359	Equipment paid	3,149,324
3,817,765		4,617,693
$16,684,921	Total application of funds	$36,283,043
	(A) NOTES: Reconciliation of funds from operations for year.	
4,968,659	Funds from operations	14,785,757
	Less:	
725,767	Interest received on provisions	998,988
40,340	Employee contributions to Professorial Superannuation	24,233
	Provisions	
464,602	Long-service leave	495,480
–	Annual leave	2,153,375
35,000	Major repairs and replacements	75,000
75,375	Professorial superannuation	94,425
9,500	Doubtful debts	1,600
–	Depreciation	5,504,613
	Financial transfers for:	
2,450,385	Equipment	3,304,280
691,000	Minor works	891,643
–	Transfer from University of Sydney for long–service leave	30,967
–	Sale of equipment	52,738
4,491,969		13,627,342
$476,690	Increase in accumulated funds	$1,158,415

The statement of Sources and Applications of Funds is to be read in conjunction with the Notes to and forming part of the accounts on pages 109 to 118.

1. STATEMENT OF SIGNIFICANT ACCOUNTING POLICIES AND METHODS

The accounts of the University have been prepared on an accrual basis and except where otherwise stated on an historical cost basis and in conformity with current Australian Accounting Standards.

The University has kept proper accounts and records for all of its operations under Section 41(1) of the Public Finance and Audit Act 1983.

In accordance with Section 41B (3)(b) of the Public Finance and Audit Act 1983 and the Public Finance and Audit (Statutory Bodies) Regulation 1985, approval has been granted to dispense with the preparation and inclusion of consolidated accounts in the Financial Statements of the University. Separate reports are prepared on behalf of the subsidiaries and it is considered that no greater disclosure is achieved through consolidating these accounts with those of the University and that the results of consolidation could be misleading. The results of operations of these subsidiaries are shown in Note 2.

All internal transfers between funds have been eliminated.

(a) **Change of accounting policy and presentation**

i) Prior to 1990 the University prepared its accounts on a "modified" accrual basis which was approved by the Treasurer under the terms of the Public Finance and Audit Act 1983. For 1990 the accounts have been prepared on an accrual basis. The principal effects of this change are:

non–current assets acquired by the University are now capitalised instead of being expensed in the year of acquisition;

non–current assets are depreciated except where otherwise stated;

the full amount of expense and liability in respect of employees' superannuation and leave entitlements is brought to account;

unexpended research grants are treated as grants received in advance.

ii) Reporting format

With the adoption of accrual accounting, the University now prepares a Balance Sheet in lieu of a Statement of Balances which showed the funds held and their monetary assets and liabilities. In addition, the reporting format used by the University in disclosing its financial affairs has been amended to reflect line items in lieu of fund accounting. A schedule of income and expenditure by source of funds is shown at Note 25.

iii) Consistency of accounting policies with previous year

The change in the accounting policies and presentation adopted in 1990 is of such significance that it is not practicable to use the previous year figures provided in the Financial Statements for comparative purposes.

b) **Doubtful debts**

Allowance has been made in the accounts for doubtful debts, the provision being calculated on all debts owing to the University.

c) **Employee entitlements**

Provision has been made for employee entitlements for annual leave, long-service leave and superannuation. The balance of these provisions at 31 December 1990 is categorised for balance sheet purposes as either non-current or current liabilities, the latter component representing an estimate of the extent to which payment is likely to be made during the next twelve (12) months.

d) **Valuation of assets**

i) Investments are shown in the balance sheet at book value.

ii) Stock holdings were valued using the most recent purchase price as cost for each item. This is a departure from Accounting Standard AAS2 in relation to the Measurement and Presentation of Inventories in the context of the Historical Cost System but the amount involved is not considered to be material.

iii) Property, plant and equipment

Where possible, property, plant and equipment acquired by the University are valued at acquisition cost. Where records are unavailable these assets have been brought to account at valuation and adjusted for accumulated depreciation. Library holdings are expensed in the year of acquisition.

Valuations adopted are as follow:

Land – last available Valuer General's valuation as shown on the summary of land accompanying the Financial Statements.

Buildings – insurance replacement value assessed by independent valuer as at 31 December 1990.

e) **Major repairs and maintenance**

Provision has been made in the Financial Statements for major repairs and maintenance of student residences. No provision has been made for any other major repairs or maintenance. Other major repairs and maintenance, together with minor repairs and maintenance, are expensed as they are incurred.

f) **Leases**

The University leases certain property and equipment by way of operating leases. Payment for these leases, whereby the lessors effectively retain substantially all the risks and benefits of ownership of the leased item, are charged to the income and expenditure statement in the periods in which they are incurred.

g) **Gains/Losses on disposal of assets**

Gains and losses on disposal of assets are included in the income and expenditure statement in the period in which the disposal of the asset occurs.

h) **Grants and other income received in advance**

Such amounts received in advance whether related to fixed assets or income are initially brought to account as current liabilities. As these are expended they are recognised as operating or deferred income as appropriate.

i) **Deferred income**

Monetary grants and contributions for capital purposes are initially brought to account as current liabilities – grants received in advance. Upon these monies being expended the current liability is extinguished and the grants and contributions disbursement is treated as deferred income. Where the asset is depreciated an equivalent amount to the depreciation is recognised as income and the deferred income is correspondingly reduced.

j) **Depreciation**

Depreciation is calculated on a straight line basis so as to write off the net cost of each non-current asset during its expected useful life. Additions are depreciated from the date of acquisition.

Depreciation has been calculated at the following rates:

Buildings	2.5%
Computer equipment	20%
Motor vehicles	10%
Other equipment	10%

k) **Financial transfers for equipment and minor works**

Section 8 of the Higher Education Funding Act, 1988, allows financial transfers to special funds which are to be used only for future expenditure on equipment or minor building projects of the institution to be treated as expenditure for operating purposes in the year in which the amount is transferred.

The following transfers were made to special funds accounts:

1989 $		1990 $
2,450,385	Equipment	3,304,280
691,000	Minor building works	891,643
$3,141,385		$4,195,923

A summary of movements on the special funds accounts is shown in Note 7(iii).

2. SUBSIDIARY COMPANIES

The results from operations before extraordinary items, in respect of the subsidiaries, are as follow:

	31 Dec 1990 $	31 Dec 1989 $
1. Friends of the University of Wollongong Ltd	8,456	3,073
2. Illawarra Technology Centre Ltd	**30 June 1990**	**30 June 1989**
	$	$
Group	951,119	(805,755)
Company	1,619,914	(17,429)

These results reflect the gain on disposal of shares in National Electronic Interchange Services Pty Limited and the write-off of goodwill arising from the acquisition of the net assets of ITC Uniadvice Limited on 1 May 1990 and from the acquisition of shares in Automation Extension Services Pty Limited and the Automation and Engineering Applications Centre Limited on 30 June 1990.

At 30 June 1990 the group included:			
Polymer Systems Technology Pty Ltd	100% holding	1989 Nil	
	($467,656)	($100,425)	
Automation & Engineering Applications Centre Limited	100% holding	1989 Nil	
	($130,017)	($15,350)	
Automation Extension Services Pty Ltd	100% holding	1989 Nil	
	($88,192)	($807)	

NB. Brackets signify a deficit.

3. CURRENT ASSETS

1989 $		1990 $
(i) Receivables		
2,178,522	Debtors	4,029,472
25,000	Less provision for doubtful debts	26,600
2,153,522		4,002,872
231,832	Sundry advances	427,165
1,860,550	Accrued income	669,236
$4,245,904		$5,099,273
(ii) Investments		
450,000	Government and semi-government securities – unquoted	–
13,110,753	Short-term deposits	18,551,857
$13,560,753		$18,551,857
(iii) Inventories		
80,799	Central store	136,238
–	Personal computers	216,485
$80,799		$352,723
(iv) Other		
$196,427	Prepayments	$542,639

4. NON-CURRENT ASSETS

(i) Property, Plant and Equipment (refer Notes 1(d)(iii) and 1(j))

	Asset value	Accumulated depreciation	Written down value	Market value *
Buildings	187,186,775	65,845,476	121,341,299	121,341,299
Computer equipment	5,525,877	3,634,996	1,890,881	1,890,881
Land	7,445,000	-	7,445,000	7,445,000
Motor vehicles	1,227,000	193,614	1,033,386	1,033,386
Other equipment	8,517,489	4,168,962	4,348,527	4,348,527
Works of art	110,347	-	110,347	110,347
	210,012,488	73,843,048	136,169,440	136,169,440

* Market values have been based on written-down values as detailed below.

Buildings have been included in the accounts at replacement cost as valued by Thompson Wark & M.D.A. Pty Ltd for insurance purposes in their report dated 30 August 1990. It is considered that this value, after allowance for depreciation, fairly represents the market value of these assets but consideration will be given to seeking a market value where this is available.

Land is included in the accounts at the current valuations assumed by the Valuer General. This is considered to represent current market value. All land is owned by the University.

Library holdings have not been brought to account but are valued at $42,986,600 on a replacement cost basis.

Other assets are valued at cost and, with the exception of works of art, depreciated. The written-down value of these assets represents an estimate of their current market value.

(ii) Receivables

27,595,421	Amount owing by Commonwealth/State Government (refer Note 22)	29,907,764
91,954	Loans to staff (refer Note 5)	71,215
$27,687,375		$29,978,979

(iii) Investments

	Government and semi-government securities	
2,901,330	Quoted	–
2,129,098	Unquoted	7,120,816
519,287	Term deposits	–
	SSAU Nominees Pty Ltd	
1	One (1) $1 share at par	1
$5,549,716		$7,120,817

5. LOANS TO STAFF

In 1984 the University established a Housing Loan Scheme for staff at professorial level with a maximum loan available of $30,000. Outstanding loans at 31 December 1990 amounted to $71,215 (1989 $91,954).

6. INVESTMENTS

Summary of portfolio as at 31 December 1990:

	Face value $	Book value $	Market value $
Government and semi-government securities Unquoted	7,120,816	7,120,816	7,120,816
Term deposits	18,032,570	18,032,570	17,459,959
Bank bills	519,287	519,287	516,958
One (1) share in SSAU Nominees Pty Ltd	1	1	1
	25,672,674	25,672,674	25,097,734

7. CURRENT LIABILITIES

(i) Creditors and Borrowings

–	Cash book balance	1,199,724
4,048,896	Creditors and accrued expenses	2,768,345
177,543	Secured loans (refer Note 9)	90,982
150,000	Advance	–
$4,376,439		$4,059,051

(ii) Provisions

192,083	Provision for major repairs and maintenance	129,105
–	Provision for long-service leave (refer Note 10(ii))	650,000
–	Provision for State superannuation (refer Note 10(iii))	1,777,000
–	Provision for Professorial superannuation (refer Note 10(i))	96,000
–	Provision for annual leave (refer Note 10(v))	2,153,375
$192,083		$4,805,480

The provision for major repairs and replacements was created for student residences only.

(iii) Special Funds (refer Note 1(k))

	Equipment	Minor works	Total
Balance at 1 January 1990	289,026	164,000	453,026
Transfer from recurrent funds	2,554,280	891,643	3,445,923
Funds provided by sale of equipment	52,738	–	52,738
Transfer from general development fund	750,000	–	750,000
	3,646,044	1,055,643	4,701,687
Less payments	3,149,324	624,025	3,773,349
Balance at 31 December 1990	$496,720	$431,618	$928,338

(iv) Other

	Income received in advance	
7,566,093	Commonwealth Government grant	10,223,835
–	State Government grant	136,655
1,751,233	Student fees	2,974,611
–	Other	985,688
9,317,326	Total income received in advance	14,320,789
	Deferred income (refer Note 1(i))	
–	Commonwealth Government grant	13,051,933
$9,317,326		$27,372,722

8. NON–CURRENT LIABILITIES

Creditors and borrowings

$1,042,839	Secured loans (refer Note 9)	$4,208,692

9. SECURED LOANS AND ADVANCES

(i) Loans due later than 5 years

Commonwealth Trading Bank loan No. 1
Commonwealth Trading Bank loan No. 2
National Australia Bank

The Commonwealth Trading Bank loans are secured by way of a first mortgage over the property known as International House. The National Australia Bank loans are secured by way of a second mortgage over this property and a first mortgage over the property known as Weerona.

(ii) Secured loans

1989 $		1990 $
	Current liability	
13,914	Commonwealth Trading Bank Loan No. 1	47,116
2,494	Commonwealth Trading Bank Loan No. 2	7,901
11,135	National Australia Bank	35,965
150,000	Australian Iron and Steel Pty Limited	–
177,543		90,982
	Non–current liability	
526,272	Commonwealth Trading Bank loan No. 1	448,565
83,842	Commonwealth Trading Bank loan No. 2	71,137
432,725	National Australia Bank	3,688,990
1,042,839		4,208,692
$1,220,382	Total secured loans	$4,299,674

During the year the University drew down additional loans from the National Australia Bank totalling $3,300,000 to assist with the funding of additional student accommodation at Weerona and Kooloobong.

10. PROVISIONS FOR DEFERRED EMPLOYEE ENTITLEMENTS

(i) Professorial Superannuation Scheme

The provision for Professorial Superannuation Scheme was established to provide members with a pension of up to 25% of salary on retirement. In 1984 the scheme was amended to provide for the payment of an additional contributory pension to members of the scheme on retirement. The scheme was closed to new members on 1 December 1987.

In reports dated 17 January 1989 and 2 March 1989, the University's liability at 1 January 1989 in respect of unfunded past service was actuarily assessed at $4.1822 million based on membership of the fund at 1 January 1989. This result complies with the requirements of the Federal Government's May 1988 Economic Statement which introduced a 15 per cent tax on employer contributions and superannuation fund investment income from 1 July 1988, and the application of the Occupational Superannuation Standards from 1 July 1990. Assumptions adopted by the Actuary in determining this liability were:

Rate of salary increase:	8% per annum, plus promotional increases at younger ages
Rate of investment return:	9% per annum (net of tax)
Rate of increase of pensions:	8% per annum.

It is anticipated that further actuarial reviews of the scheme will be undertaken every three years.

Movements in the provision during the year were:

1989 $		1990 $
1,153,893	Balance at 1 January 1990	1,309,608
–	Add unfunded liability brought to account	2,654,718
1,153,893	Amended balance at 1 January 1990	3,964,326
75,375	Add contribution from general recurrent fund	70,222
7,033	contribution from members for optional contributory 5% pension scheme	8,892
164,075	interest earnings from investments	234,723
1,400,376		4,278,163
90,768	Less payments	95,963
$1,309,608	Balance at 31 December 1990	$4,182,200

(ii) Long-Service Leave

3,538,263	Balance at 1 January 1990	3,871,045
–	Add unfunded liability brought to account	1,277,245
3,538,263	Amended balance at 1 January 1990	5,148,290
464,602	Add contributions	495,480
508,362	interest earnings from investments	676,863
–	transfer from University of Sydney	30,967
4,511,227		6,351,600
640,182	Less payments	607,805
$3,871,045	Balance at 31 December 1990	$5,743,795

The accrued long-service leave liability in respect of employees with ten or more years' service at 31 December 1990 is estimated at $5,743,795 (1989 $5,713,553).

(iii) State Superannuation Fund

The University contributes to the New South Wales State Superannuation Fund in respect of present and former members of staff who are, or were, members of the fund. In a report dated 25 February 1988 the Government Actuary assessed the gross liability of the University at 31 December 1987 at $23 million. In accordance with a formula provided by the actuary, the gross liability at 31 December 1990 was $29.91 million (1989 $26.82 million). The unfunded liability has been brought to account as an amount owing by the Commonwealth/State Governments (*refer* Note 22). Assumptions adopted by the actuary in determining the University's liability were:

Growth of salaries	7% per annum plus a salary scale
Indexation increases in pensions	5% per annum
Interest earnings on assets	8% per annum

The actuary advises that changes in the economic bases will not substantially affect the valuation results while the age distributions and proportions of the various classes of membership remain reasonably stable.

A number of changes to the scheme came into effect from 1 July 1985. However, the actuary advises it does not appear these changes will dictate acceleration of the next actuarial review which was due at 31 December 1990.

1989 $		1990 $
25,069,697	Balance at 1 January 1990	26,817,129
1,747,432	Add increase in amount unfunded (refer Note 22)	2,312,343
–	transfer of liability from State Public Service Superannuation Fund	778,292
$26,817,129	Balance at 31 December 1990	$29,907,764

(iv) **State Public Service Superannuation**

The New South Wales State Superannuation Fund was closed to new members on 1 July 1985 and was replaced by the State Public Service Superannuation Scheme. Staff members appointed after 1 July 1985 could optionally join the new scheme. The State Public Service Scheme was closed to new members on 31 March 1988. From 1 July 1989, members of the State Public Service Scheme were transferred to the State Authorities Superannuation Scheme (SASS). The State Authorities Superannuation Board has now advised that any past service liability for these members is included in the SASS gross liability. The provision created to fund the estimated liability arising under the State Public Service Scheme has been transferred to the Provision for State Superannuation. The new schemes currently in operation, the State Authorities Superannuation Scheme (SASS) and the Superannuation Scheme for Australian Universities (SSAU) are both fully funded schemes with no deferred liabilities.

586,816	Balance at 1 January 1990	778,292
191,476	Add increase in amount unfunded (refer Note 22)	–
778,292		778,292
–	Less transfer to State Superannuation Fund	778,292
$778,292	Balance at 31 December 1990	$ –

(v) **Annual leave**

The University has a liability for untaken annual leave. Payments for leave taken in-service or on termination are charged to current revenue. The estimated liability for untaken annual leave at 31 December 1990 based on a sample of 24 employees is $2,153,375. This amount has been brought to account as an abnormal item in the income and expenditure statement.

11. MOVEMENTS IN RESERVES

(i) Asset revaluation reserve

Balance at 1 January 1990 (refer Note 12)	120,569,292
Transfer to income and expenditure statement	5,236,868
Balance at 31 December 1990	$115,332,424

(ii) Loan repayment reserve

Balance at 1 January 1990	-
Transfer from income and expenditure statement	165,000
Balance at 31 December 1990	$165,000

The loan repayment reserve has been established in recognition of the University's liability to repay a $3,300,000 bank loan used to fund additional student accommodation (refer Note 9(ii)).

12. As a result of the change in accounting policy referred to in Note 1(a), the following adjustments have been made directly to retained earnings in accordance with Accounting Standard AAS1 'Profit and loss or other operating statements'.

(i) Accumulated funds	
Balance reported at 31 December 1989	3,081,071
Less adjustments for capital works in progress at 31 December 1989	
Capital grant transferred to deferred income	2,500,000
	581,071
Add expenditure on capital works in progress in 1989 transferred to property, plant and equipment	2,495,490
	3,076,561
Less Unfunded liability for long-service leave brought to account	1,277,246
Unfunded liability for Professorial superannuation fund brought to account	2,654,718
Adjusted balance at 1 January 1990	$855,403 Dr
(ii) Asset revaluation reserve	
Adjustment to bring property, plant and equipment to account as at 1 January 1990	$120,569,292

13. AUDIT FEE

The fee paid to the Auditor-General for auditing services in 1990 was $45,000 (1989 $37,200). The Auditor-General received no other benefits.

14. INTEREST PAID

The total amount of interest paid, or due and payable on loans for the 1990 year, was $845,168 (1989 $178,777).

15. CONTINGENT LIABILITIES

(i) As at 31 December 1990 outstanding loan guarantees provided by the University under the University of Wollongong Staff Members Housing Loans Scheme with the National Australia Bank totalled $19,788 (1989 $26,967).

(ii) In 1987 and 1990 the University furnished letters of comfort to the National Australia Bank Limited in support of loans given to the University of Wollongong Union and the University of Wollongong Recreation and Sports Association. These arrangements do not involve the University in any undertaking to pay any shortfall in repayments. A similar letter has been provided to the National Australia Bank in 1991 in support of a loan given to the Illawarra Technology Corporation Ltd.

16. TRUST FUNDS – PROFESSORIAL SUPERANNUATION SCHEME MANAGED FUNDS

Movements in the funds during the year were:

1989 $		1990 $
(i) Widows annuity accumulation fund		
98,672	Balance at 1 January 1990	115,944
5,133	Add contributions	5,133
14,737	interest earnings from investments	20,813
118,542		141,890
2,598	Less payments	2,598
$115,944	Balance at 31 December 1990	$139,292

(ii) Managed fund

640,070	Balance 1 January 1990		330,432
28,174	Add	contributions	34,411
38,593		interest earnings from investments	66,590
706,837			431,433
376,405	Less	payments	–
$330,432	Balance at 31 December 1990		$431,433

17. CAPITAL PROJECTS

The following capital projects were contracted for in 1989 and 1990 on the basis that funds would be made available under Commonwealth legislative provisions and from University development funds and an internal loan.

	1991 commitment	1992 commitment
General purpose academic building	$1.26M	–
General science building	$4.40M	$0.54M
Multi–storey car park	$1.29M	–

18. LEASE OR HIRE EXPENDITURE

Contracts for lease or hire expenditure are estimated at $101,350 as at 31 December 1990, detailed as follows:

Photocopying machines	1991 commitment	$101,350

19. The combined statement of income and expenditure has been prepared in accordance with the Public Finance and Audit (Statutory Bodies) Regulations This statement combines a number of funds which, under granting conditions, can be utilised only for specified expenditure purposes. These special funds cannot be allocated to general–purpose expenditure categories.

20. HIGHER EDUCATION CONTRIBUTION SCHEME

In 1989 the Commonwealth Government introduced the Higher Education Contribution Scheme to be collected by the University. Funds collected under the scheme are offset against the legislated grant from the HECS Trust Fund.

In 1990 an amount of $1,201,000 of the $1,218,843 reported in the combined income and expenditure statement was withheld from the legislated grant of $9,789,000, being the amount estimated to be collected. The amount collected in excess of $1,201,000 represents funds paid by students in 1990 which will be reported to and adjusted by the Commonwealth Government in 1991.

21. COMMONWEALTH GRANT

1989 $		1990 $
41,155,700	Legislated grant	45,002,000
155,000	Add amount deducted (including interest) for early retirement scheme	161,000
41,310,700	Amount received from Commonwealth Government for recurrent	45,163,000
7,928,000	Balance of HECS Trust Fund grant (Refer Note 20)	8,588,000
$49,238,700		$53,751,000

22. AMOUNT OWING BY COMMONWEALTH/STATE GOVERNMENTS

The State Grants (General Revenue) Amendment Act 1987 indicated that the Commonwealth Government and the New South Wales State Government will share superannuation costs in a way that recognises the respective responsibilities of Commonwealth and State Governments which prevailed when the liability was incurred.

In 1990, an amount of $2,312,343 was brought to account to meet the increase in the net unfunded past service cost for State superannuation (refer Notes 10(iii) and (iv)).

	State Superannuation $	State Public Service Superannuation $	Total $
Amount owing for unfunded liability at 1 January 1990	26,817,129	778,292	27,595,421
Increase in amount owing for unfunded liability	2,312,343	–	2,312,343
Transfer of SPSS to State Superannuation Fund	778,292	(778,292)	–
Amount owing for unfunded liability at 31 December 1990	$29,907,764	–	$29,907,764

23. PRODUCTIVITY SUPERANNUATION SUPPLEMENTATION

From 1 April 1988 the University became liable for employee superannuation entitlements equivalent to 3 per cent of salary per annum, arising from a productivity wage claim decision handed down in 1986. The Commonwealth Government provides supplementary funding to cover this cost. In 1990, an amount of $578,000 was included in the Commonwealth Government grant for 3% productivity superannuation.

24. FULL-FEE COURSES

(i) Under the Export Market Development Grants Act 1974, certain approved promotional expenditure is refunded by way of a grant. In 1988 the University submitted a claim for $200,000 of which $164,362 was allowed. The balance of $35,638 was subsequently paid in 1990 and has been recorded as a prior year adjustment. A claim for $200,000 submitted in 1990 for approved expenditure incurred in the year ended 30th June 1990 has been accrued.

(ii) At 31 December 1990 $2,953,326 had been received from students in respect of 1991 courses.

25. ANALYSIS OF INCOME AND EXPENDITURE BY FUND SOURCE

The combined income and expenditure statement has been prepared after eliminating capital items, ie, capital grants and building and equipment expenditure, and internal transfers, and adjusting for deferred grants and reserves. In many cases, the items which have been eliminated for the purpose of this report are included in the funding received from granting bodies for operating purposes and must therefore be included in reports to those bodies.

The attached schedule provides a detailed analysis of income and expenditure by fund source in accordance with the combined income and expenditure statement, followed by a reconciliation to show the results for the year to be reported to the funding bodies before adjustments and eliminations required for accrual accounting.

26. ASSISTANCE TO ASSOCIATED ORGANISATIONS

All identifiable costs and services relating to companies and organisations associated with the University are charged out to those entities.

27. In accordance with Section 41B(1)(d) of the Public Finance and Audit Act 1983 and the Public Finance and Audit (Statutory Bodies) Regulation 1985 a summary of land owned or occupied by the University together with the values thereof accompanies these Financial Statements. This summary has not been audited.

ANALYSIS OF INCOME AND EXPENDITURE BY FUND SOURCE

Fund Source	Recurrent	Research	Other Special Purpose	International Students	Student Residences	Other	Total
	$	$	$	$	$	$	$
INCOME							
Commonwealth Grants							
Recurrent	53,751,000						53,751,000
Research		3,578,335					3,578,335
Other			696,347	200,000			896,347
State Government Grants							
Conservatorium	83,000						83,000
Nurse Education	2,738,312						2,738,312
Research		93,035					93,035
Other			152,827				152,827
Other Grants and Donations for research		115,816					115,816
Scholarships and Prizes			300,457				300,457
Special purpose accounts			7,023,229				7,023,229
Higher Education							
Contribution Scheme	1,218,843						1,218,843
Student Fees	859,769			5,402,169	3,648,792		9,910,730
Interest		24,709	2,925,977			998,988	3,949,674
Other	254,956					110,000	364,956
Commonwealth/State for superannuation						2,312,343	2,312,343
Deferred grants						135,019	135,019
TOTAL INCOME	58,905,880	3,811,895	11,098,837	5,602,169	3,648,792	3,556,350	86,623,923
EXPENDITURE							
Audit Fees	45,000						45,000
Bad Debts	33,688						33,688
Consumables	3,422,050	1,503,045	5,003,265	1,266,229	1,155,706		12,350,295
Depreciation						5,504,613	5,504,613
Interest Paid	12,696				832,472		845,168
Library	1,518,293			133,090			1,651,383
Repairs and maintenance	628,525				257,194		885,719
Salaries and related costs	38,548,095	2,163,196	1,369,191	1,222,506	707,747		44,010,735
Scholarships and Prizes	572,632	484,153	374,127	40,801			1,471,713
Superannuation	4,167,750	88,703	59,173	55,060	43,939		4,414,625
Travel	719,515	348,678	189,990	241,720	53,455		1,553,358
Overheads	4,124,477				580,120		4,704,597
Other:			11,869		171,977		183,846
Provisions							
Doubtful debts	1,600						1,600
Long service leave	426,704	26,603	14,685	12,707	14,549		495,248
Annual leave						2,153,375	2,153,375
Repairs and replacements					75,000		75,000
Professorial superannuation	67,270						67,270
Financial transfers for:							
Equipment	2,554,280		750,000				3,304,280
Minor Works	891,643						891,643
TOTAL EXPENDITURE	57,734,218	4,614,378	7,772,300	2,972,113	3,892,159	7,657,988	84,643,156
Surplus for year prior to adjustments	1,171,662	-802,483	3,326,537	2,630,056	-243,367	-4,101,638	1,980,767
Less interest transferred to provisions						998,988	998,988
	1,171,662	-802,483	3,326,537	2,630,056	-243,367	-5,100,626	981,779
Add prior period adjustment	140,998			35,638			176,636
Surplus for year as per Income and Expenditure Statement	**1,312,660**	**-802,483**	**3,326,537**	**2,665,694**	**-243,367**	**-5,100,626**	**1,158,415**
Adjustments and eliminations added back							
Capital items	-755,482	-483,471	-1,141,106	-97,296	-175,964	-9,188,435	-11,841,754
Internal Transfers	-536,377	-66,087	453,464	-101,000	150,000	100,000	–
Income received in advance		2,200,131	24,583				2,224,714
Capital grants						9,169,000	9,169,000
Deferred income						135,019	135,019
Depreciation						5,504,613	5,504,613
Results for year before adjustments and eliminations	**20,801**	**848,090**	**2,663,478**	**2,467,398**	**-269,331**	**619,571**	**6,350,007**

GENERAL RECURRENT FUNDS BUDGET
(UNAUDITED)
AS REQUIRED UNDER SECTION 7(1)(A)(111)
ANNUAL REPORTS (STATUTORY BODIES) ACT 1884 AND REGULATIONS 1985

	1990 Actual $,000	1990 Approved Budget $,000	1991 Approved Budget $,000
INCOME			
Federal Grants			
General university purposes	54,970	54,970	54,432
State Grant			
General university purposes	2,821	2,821	2,500
Sponsored student places	549	549	1,039
Other income			
Contribution towards expenditure from other university accounts	311	311	
Contribution towards expenditure from external organisations	61	61	61
Miscellaneous	194	176	164
	58,906	58,888	58,196
LESS EXPENDITURE			
Teaching and research	32,572	32,804	34,522
Research only	930	751	930
Library	3,723	3,668	3,694
Computer services	1,075	1,109	1,114
Other academic services	853	836	822
Student services	1,153	1,172	650
Administration	6,250	6,312	5,691
Overheads	3,349	3,334	3,428
Buildings and grounds	4,254	4,157	3,977
Public services	1,321	1,359	924
Provisions	101	101	995
Equipment	2,554	2,554	2,534
Minor works	891	891	565
	59,026	59,048	59,846
Excess of expenditure over income for the year	120	160	1,650
Less adjustments for prior years	140		
Surplus for year	20		
Accumulated deficit 31 December 89	462		
ACCUMULATED DEFICIT AT 31 DECEMBER 1990	442		

Notes: The budget shown for 1990 is the amended budget at 31 December, 1990. The 1991 budget is the first budget approved for the financial year and was prepared towards the end of the preceding year at December 1989 cost levels. Both expenditure and Federal and State grant income are updated in line with salary award variations during the financial year.

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